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Title: AN ECONOMIC ANALYSIS OF SOME FACTORS RELATED TO LOW INCOME IN RURAL OREGON WITH SPECIAL REFERENCE TO THE ROLE OF EDUCATION

Abstract Approved: (Richard S. Johnston)

This study attempted to discern the effects of formal and nonformal education upon labor incomes. Over 400 questionnaires were obtained from urban and rural residents at various income levels in a county designated by the U.S. Census Bureau as a Standard Metropolitan Statistical Area. Formal and nonformal learning experiences of adults were hypothesized to have significant, positive effects on labor incomes and hence to constitute a valuable consideration for programs directed to economically disadvantaged groups and individuals. This study also responded to research of others indicating education is unimportant in determining income levels.

The stated objectives of the project were 1) to identify selected social and economic characteristics of income earners in a selected area of Oregon with urban and rural populations; and 2) to investigate the nature of possible

interdependencies between income and selected social and economic characteristics, with emphasis on the role of education.

Using variables shown by other researchers to be associated with income levels, this model incorporated formal and informal education variables hypothesized here to also be associated with income levels. The model required estimation in two stages, for some occupations were notably different from others. Empirical results indicated partial success. For one group of occupations, formal schooling, specific vocational training, and on-the-job training were highly significant in a regression model where labor income was the dependent variable. In another group of occupations, general military training and job apprenticeship emerged as highly significant. Over all, informal education contributed to the explanatory power of the equations.

Perhaps one of the more important contributions of this study was the exploratory nature of certain sections. Numerous hypotheses were implicitly and explicitly generated. Many of these constitute issues important to the development of income distribution theory and the theory of human capital. The role of education in income determination deserves more attention.

An Economic Analysis of Some Factors Related to Low Income in Rural Oregon with Special Reference to the Role of Education

by

Robert Oneal Coppedge

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Associate Professor of Agricultural Economics

Head of Department of Agricultural Economics

Dean of Graduate School

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Typed by Deanna L. Cramer for Robert Oneal Coppedge

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Timothy M. Hammonds supplied advice in another crucial area, the quantitative analysis and interpretation. A. Gene Nelson, though not a member of my graduate committee, was of assistance in getting the data to that point where analysis could begin. Both these individuals possessed and shared vital expertise. Other members of my graduate committee made suggestions which helped shape the results and avoid some pitfalls. These individuals were James B. Fitch, Joe B. Stevens, and John A. Young.

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Last, but first, my wife and children deserve mention. Without them, it would not have been much fun, or as rewarding.

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I. INTRODUCTION

> Living poor is like being sentenced to exist in a stormy sea in a battered canoe, requiring all your strength simply to keep afloat; there is never any question of reaching a destination. True poverty is a state of perpetual crisis, and one wave just a little bigger or coming from an unexpected direction can and usually does wreck things. Some benevolent ignorance denies a poor man the ability to see the squalid sequence of his life, except very rarely; he views it rather as a disconnected string of unfortunate sadnesses. Never having paddled on a calm sea, he is unable to imagine one. I think if he could connect the chronic hunger, the sickness, the death of his children, the almost unrelieved physical and emotional tension into the pattern that his life inevitably takes he would kill himself...Death, of course is the great release... (47, p. 173-4).

Problem Statement

Understanding how an economy's wealth and income are distributed among its members has long been of interest to economists and other social scientists. Of particular current concern in the United States is understanding the relationships between certain economic factors and low incomes in this country.

Most government policies are at least partially designed to increase the incomes of those at the lower end of the income distribution (e.g., "progressive" taxation

policies, income supplement programs, job retraining programs). There is currently a great deal of interest in rural poverty and in the effects of various government policies and activities on the incidence of low income -- both farm and non-farm -- in rural areas. Recent legislation has indicated the interest of the federal government in facilitating growth and development in rural areas (57, p. 1). This interest is expressed through specific programs designed to improve opportunities in rural areas. The present research project was designed to furnish input into formulation of programs intended to raise incomes of the poor.

Responses to low incomes as a problem to be addressed directly have not always been popular. More so in the past than now, the acceptable solution to low incomes was to stimulate growth (and hence per capita income) of the total economy. One argument popularized by Galbraith, asserts that much of present-day poverty "...is not effectively remedied by a general and tolerably well-distributed advance in income." (17, p. 254) Increased recognition of the need for directed efforts and feelings ranging from guilt to philanthropy have perhaps been among factors contributing to a continuing interest in the particular circumstances of economically deprived peoples.

Misuse and conservation of natural resources has come to be an accepted problem in the nation. Misuse of human

resources is also a serious problem, both for the poor and the middle classes. Monetary costs of correctional and welfare systems, for example, are not borne by the poor. Wise use of natural and human resources can result in increased benefits to all.

Poverty is generally considered a relative concept. Definitions differ with the observer and with prevailing notions of adequate standards of living, but basically poverty is relative deprivation or inequality (59, p. 13). Deprivation or unequal distribution of monetary and human resources can conceivably be a characteristic, a cause, and a perpetuator of poverty. Similar connotations may be ascribed to deprivation or unequal distribution of economic, social, and political opportunity.

It will be useful at this juncture to distinguish between poverty and low income as used in this study. Income is an absolute measure of the flow of monetary resources available to a unit of observation. Low income is the portion of the income spectrum below some absolute level, a level which varies with the observer. Poverty, however, is a more complex measure usually providing:

> a range of income cutoffs adjusted by such factors as family size, sex of family head, number of children under 18 years old, and farm and non-farm residence. At the core of this definition of poverty was a nutritionally adequate food plan ("economy" plan) designed by the Department of Agriculture for "emergency or temporary use when funds are low". (55, p. 19)

Such poverty definitions provide for little more than a bare existence, with little opportunity to accumulate assets and move out of poverty. The term poverty in this study was used descriptively. The population of interest was that population having low income, although a representative cross-section of the total population was obtained.

A definition of rural was also essential to this study. The U.S. Census considered rural residence as living outside urbanized areas or in places of less than 2,500 inhabitants (53, p. App. 1). The Rural Development Act of 1972 defined as rural those areas of 10,000 population or less (57, p. IX). This last definition was used in this study.

In Oregon, 234,848 persons had incomes in 1970 less than the federal poverty level (53, p. 163). Another 100,000 had incomes less than 25 percent above this level. A higher percentage of individuals living alone were at poverty levels, and rural (census definition) incidences of poverty were also higher. Persons in rural areas constituted 37 percent of all persons at poverty levels. Proportionately more of poverty families lived in rural areas than did unrelated individuals.

In 1970 a non-farm four-person family with a male head was considered to be in poverty circumstances according to the above definition if their family income was $3,745 or less (53, p. App. 30).

This study emphasized the over-all nature of poverty, but not to the extent of excluding either urban or rural considerations. It is important to point out that rural poverty is not necessarily farm-related. Small farm

agriculture is a source of income to many. Nearly 80 percent of all Oregon farms in 1969 were part-time, retirement, or had sales inadequate to generate significant net farm income (51, p. 3). Many persons on these farms, however, had other jobs. In 1970, 50,208 employed persons lived on farms, but only 24 percent of employed persons living on farms reported their occupation as farmer or farm manager (Table 1). In all, 15,493 persons reported their occupation as farmer or farm manager. There were approximately 34,500 farms in Oregon in 1969 (56, p. 5). Thus, there appear to be many more farms than full-time farmers. For these and similar reasons evident in the sources cited a above, it is difficult to classify rural residents as strictly farm or non-farm. Small farm agriculture, moreover, is considered to be not a cause of low income, but rather part of the circumstances of some individuals as adjustments are made to adversity.

Table 1. Occupation of Employed Persons 16 Years and Over by Residence in Oregon, 1970.

Item	Rural farm residence	Total, all residences
Farmers and farm managers...	11,938	15,493
All employed persons.....	50,208	778,745
Percent.....	23.8	2.0

SOURCE: (53, p. 159)

This study drew upon past economic research results and methodologies to explore aspects of income determination. In particular, an attempt was made to understand the relationships between incomes and education of income earners.

Many economic studies of poverty and the distribution of income have focused on factors affecting relative income levels without fully accounting for how income levels may, in turn, affect the factors themselves (e.g., 1, 4, 50, 48). While often recognizing the interdependencies, investigating this phenomenon has not been a principal objective. These and similar studies have provided a basis for the study described herein to explicitly consider certain of these interdependencies and related questions.

Recognition of gaps in the theory of personal income distributions has existed for several years, especially with respect to the determinants of these distributions (e.g., 4, p. 358; 6, p. 226; 36, p. 27). These gaps have continued to some extent while income questions become increasingly important (e.g., 60, p. 49, 90). This study was designed to increase applicability of knowledge relative to education and income distribution questions.

The theoretical base for this study was strengthened by recent works presenting new developments, extensive reviews of past and current work and state of the arts discussions for non-technical audiences in income distribution theory (e.g., 8, 9, 12, 33, 29). These and other research

studies of poverty, some cited later, provided significant potential for increasing the level and applicability of knowledge.

Objectives

Two objectives were identified:

1. To identify selected social and economic characteristics of income earners in a selected area of Oregon with urban and rural populations;
2. To investigate the nature of possible relationships between income and selected social and economic characteristics, with emphasis on the role of education.

The first objective served a descriptive purpose by establishing the identity and dimension of the problem for the selected area. Establishing the distinctive characteristics of income earners provided a groundwork for further analysis and allowed a more complete statement of the nature of the problem addressed.

The second objective was of major importance. While attempting to account for the variation in incomes by observing relevant variables, particular attention was devoted to the inter-relationships between income and education in its many forms. More complete knowledge of this

relationship was expected to be useful in designing and implementing appropriate policy programs.

It was deemed important in this study to reduce education into its formal and not-so-formal components. When researchers such as Jencks and others (discussed in Chapter II) are cited in popular magazines as supportive of the argument that education is not helpful in solving low income problems, we must consider the implications of this conclusion (61, p. 41-42; 5, p. 88). While short term "solutions" to income problems may not include increased formal education, informal learning experiences may be most appropriate in certain situations.

The discussion that follows should be read with the understanding that decision or income determination models were not focal points for this investigation. In a sense, an expectations model was studied, since expectations of individuals regarding payoffs from learning experiences influence acquisition of these experiences. The model was based on expectations and expectations may not be realized or may be influenced by factors other than anticipated payoff. Since the testing of the model was ex post, the tests indicated to some extent whether expectations were realized.

The position was taken herein that variables were appropriately classified for the task of relating selected types of learning experiences to income. While certain other forces might be more powerful in explaining income

levels, such explanation was not of major concern. Forces which explain individuals' occupation-geographic characteristics (hence perhaps a large part of income) are not necessarily the same as forces which will influence income given these characteristics. Taking circumstances as given, educational elements as later described can be relevant considerations for policy makers.

II. INCOME AND EDUCATION

The Conceptual Framework

The conceptual base for the economic analysis herein may be found in the microeconomic theory of production and distribution as practiced by many economists (13, p. xvii). Otherwise referred to as neoclassical theory, this approach allows economic appraisal of changes affecting a hypothesized relationship between income and education in terms of marginal productivity theory or derived demand for factors of production. Macroeconomic implications for aggregations (groups of individuals) can be "constructed by analogy" (13, p. 4, 215).

Neoclassical theory postulates a production function which in simplest form says that the quantity produced is a function of the inputs employed:

$$q = f(X_L, X_C)$$

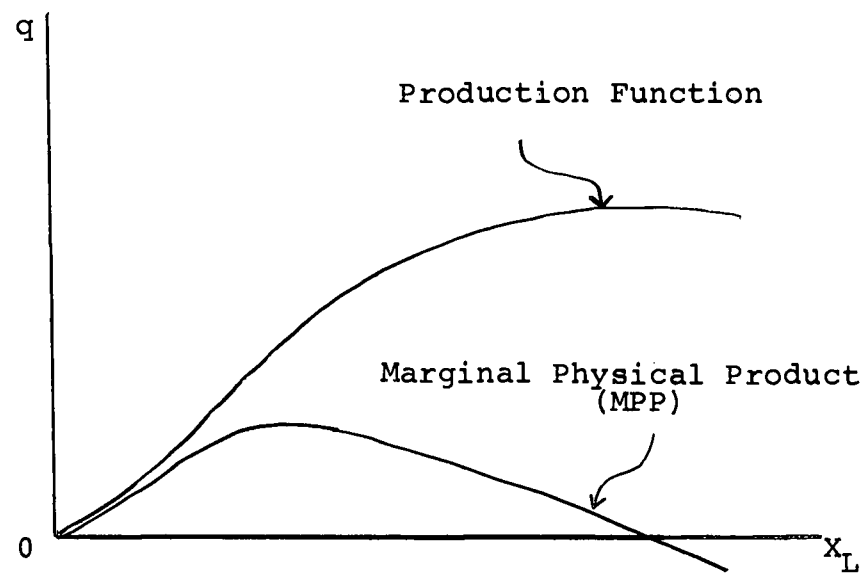
where q = quantity of output
X_L = labor input
X_C = capital input

The first partial derivative of this function with respect to either input indicates the marginal physical product (MPP) of that input:

$$\frac{\partial q}{\partial X_L} = MPP_{X_L}$$

$$\frac{\partial q}{\partial X_C} = MPP_{X_C}$$

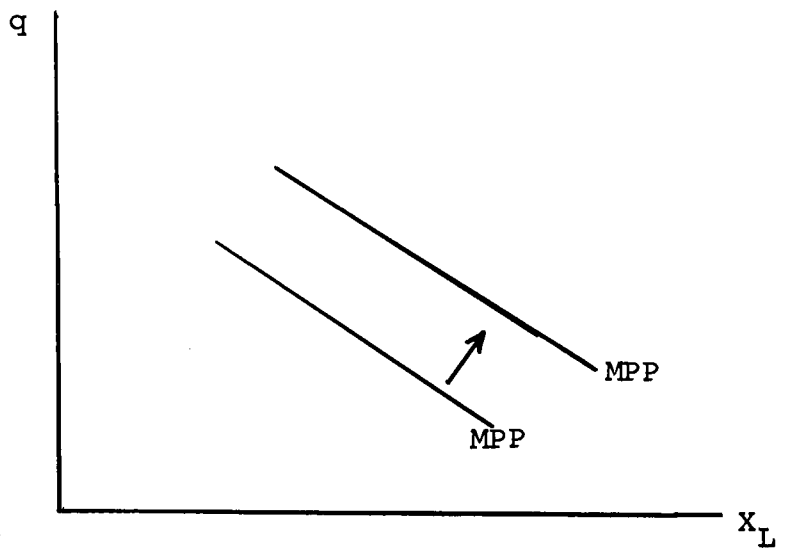
In a general case, the production function and marginal physical product curve are represented by this graph, where X_C is assumed constant for purposes of illustration:



The relationship between the total and marginal product curves can be stated more rigorously, but the crucial point to this analysis is the assumption that the marginal physical product curve decreases but remains positive over the region in which production take place in an economic firm (13, p. 116-120).

It will be useful at this point to discuss a "curve shifter" for the marginal physical product of labor. Assume any given level of labor inputs (hours or days). Introduce

an increased ability to produce the output q by that given level of inputs. This increased ability can be compared to a change in some input variable (labor quality) previously held constant. Assume also that the production function becomes somewhat steeper as it shifts up (the slope changes). This relationship allows the marginal physical product to shift up, or to the right, as a result of increased productivity so that for a given input, output is greater:



Marginal physical product has been presented as downsloping to the right, and susceptible to movements induced by changes in productivity of the input. One step remains to convert the marginal physical product of labor into the demand for labor as assumed in this study.

The value of an input is the value of the input's output. In terms of the perfectly competitive firm, multiplying the marginal physical product by the price of the output produced yields the value of the marginal product curve (VMP) which "is established as the individual demand for labor curve" (14, p. 364). Introduction of numerous refinements to this statement of the labor demand curve for the firm and for the industry do not affect the basic premise as assumed, that the labor demand schedule slopes downward to the right and can be shifted by changes in productivity, as illustrated above.

With this basic framework, we add the assumption that the supplier of labor services, the worker, expects that if his productivity rises, his wages (and therefore his income) rise also. This further assumes that labor supply is of normal configuration with an upward slope to the right; in other words labor supply is not perfectly elastic. In fact, for fully-employed suppliers of labor, the labor supply curve may be taken as relatively inelastic. As an aside, much room for theoretical development remains with respect to the details of labor supply and demand (36, p. 29).

Mention should be made of one possibility. The model as discussed assumes one individual can increase his productivity, thereby accruing a higher income. That is, his relative (to all individuals) productivity rises. However,

if all individuals increased their productivity in like amounts, the first individual would realize no relative advantage and his income would not rise. The model developed here assumes an increase in productivity for an individual is a relative increase.

The question to be addressed now is the concept of education as an economic variable as seen by the worker whose productivity is being affected.

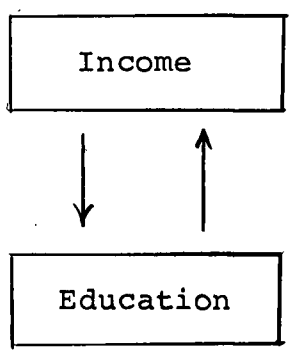
Education as an Economic Variable

Education is among the most often cited variables in efforts to explain current wage and income levels. It is the impact of education on income which is of interest in this study. Other variables are included to account for their influence, but the nature of the influence of these variables upon income is not rigorously ascertained.

In general, as people acquire greater (relative to the total population) levels of schooling, skill, or training, then incomes tend to increase as productivity rises and they become aware of and qualified for better paying occupations (1, 3, 27, 50, 30, 48). Education may also influence income through an increased ability of the more highly educated persons to implement new technological innovations, thereby increasing adaptation to change (32, p. 70).

Education may be acquired for two reasons, one being a wish to simply know more about certain subjects, or to impress others. This form of education may be likened (but not too closely) to a consumption good, in that it is enjoyed when purchased, and in the future, but is not engaged in for the explicit purpose of producing income or obtaining employment. Education as similar to an investment good, however, is undertaken for the express purpose of influencing income or employment opportunities by increasing productivity. In this sense it may be likened in a rough fashion to a physical capital item which is purchased for its usefulness in producing income or earnings. (More rigorous definitions of education are discussed later.)

The interrelationship between income and education is not a simple one. The "poverty cycle" or "culture of poverty" concepts popular with many observers state in part that low income levels, "cause" low education levels which in turn "cause" low income levels, ad infinitum (22, p. 40). Accepting for the moment this statement, the relationship between education and income is illustrated by:



However, such a system is not complete and many of these observers might agree if required to rigorously state their concept of the poverty cycle.

To more completely state this relationship, take the case of an individual. It is assumed the acquisition of a given educational experience necessarily leads to the expectation of an increase in income, ceteris paribus, or the experience would not have been acquired. The individual expects an increase in his labor income as the increase in education leads to a greater human capital stock. Whether this increase in human capital effects a rise in labor income in the current time period or in a future time period is dependent upon the psychological, social and economic characteristics of the individual and the geographic region in which he lives. When the income change occurs, its magnitude is partially dependent upon the length of the time period, but more importantly upon the psychological, social, and economic characteristics of the individual and the geographic region in which he lives.

Upon realizing the increase in income, the individual will have increased opportunity to participate in additional educational experiences. Actual participation in such new experiences is dependent upon his choice, his social and economic characteristics, and the characteristics of the region in which he resides. Once again, the time lag is immaterial.

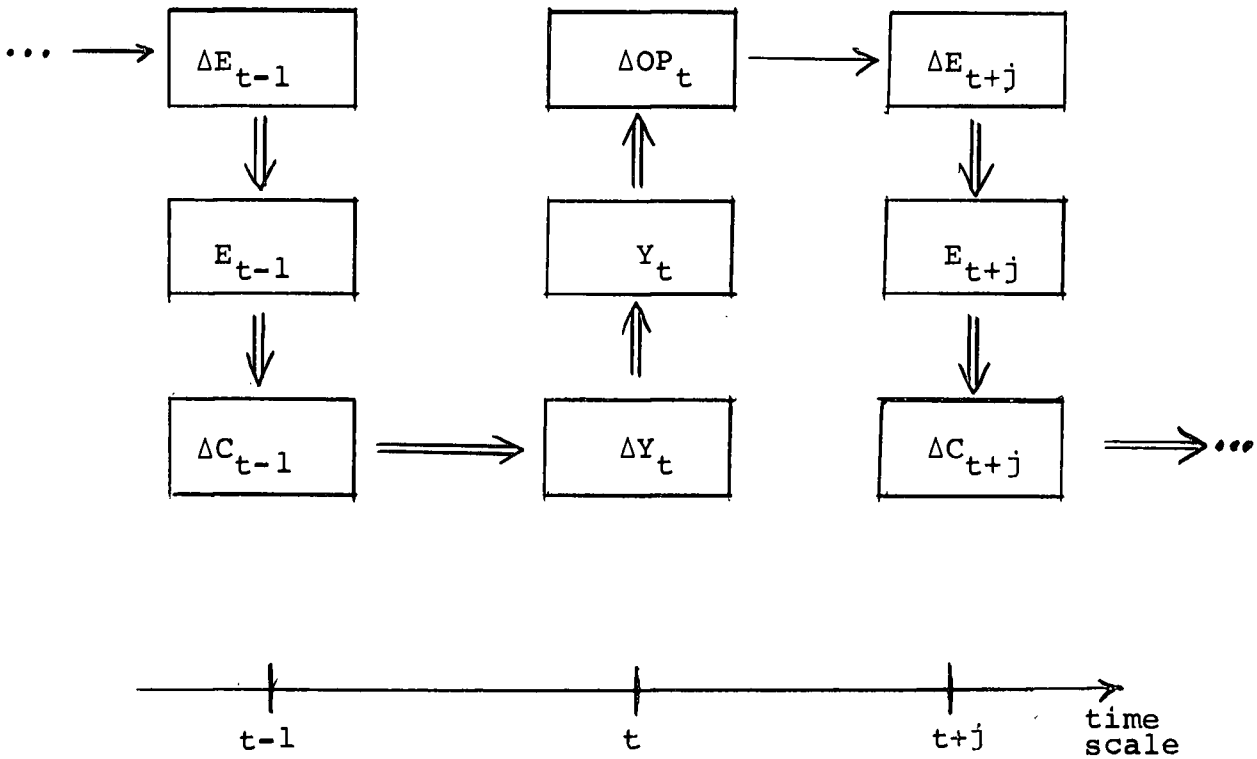
The underlying recursive nature of the system thus depicted is presented in Figure 1.

Time periods are presented only to denote the non-simultaneous nature of the system and the fact that a time frame exists. A recursive system exists but is not used, per se, in this study. Education in previous time periods is treated as if it were determined exogeneously.

At any given point in time it is possible to use cross section data to observe an individual and determine his current income level and his stock of education acquired in previous time periods. Increments in education, ΔE, are revealed in a larger stock of education. Education as of any time period could have been acquired in any previous time period. By observing these quantities we are able to evaluate the relationship pictured, as, say, $\Delta E_{t-1} \Rightarrow C_{t-1} \Rightarrow \Delta Y_t$, through observing the stock of education and current income. By evaluating this relationship, $E_{t-} \Rightarrow Y_t$, the hypothesis that education leads to higher income may be tested. The sum total of all educational experiences implies a sum total of income changes which is equal to total income, ceteris paribus. In other words, for any individual,

$$\Delta E_{t-1} \Rightarrow \Delta Y_t, \text{ thus}$$

$$\sum_{i=o}^{t} \Delta E_{t-i-1} \Rightarrow \sum_{i=0}^{t} \Delta Y_{t-i}$$



j = 1, 2, ... M

t = time period

$\Longrightarrow$ = implies

$\longrightarrow$ = may lead to

ΔE = change in education

E = total stock of education

ΔC = change in human capital stock

ΔY = change in labor income

Y = labor income

ΔOP = change in opportunity for education experiences

Figure 1. Relation between Income and Education.

$$\text{Since } \sum_{i=o}^{t-i} \Delta E_{t-i-1} = E_{t-1} \text{ and } \sum_{i=0}^{t-1} \Delta Y_{t-i} = Y_{t},$$

$$\therefore \text{ then } E_{t-1} \Rightarrow Y_{t}$$

This model says that two individual acquiring an identical level and type of education in the same time period, might in five years have different incomes. This difference is attributable to differential characteristics of the two. The eventual size of the actual income increment is dependent upon other characteristics of the individual or the area in which he resides, as well as upon his education. But if we control for other differences, that is if other characteristics are identical, the educational increment will result in equal increments in income. This relationship can be further pictured for individuals as follows:

	TIME PERIOD				
	1	2	3	4	N
Individual 1	E	$10	$10	$10.....	$10
Individual 2	E	$10	$10	$10.....	$10
Individual 3		E	$10	$10.....	$10

Where E is a given level and type of educational experience and $10 is the increment in income associated with the educational experience, when individual characteristics are the same. For individuals 1 and 2, the educational experience in time period 1 led to an income gain in time period 2 and thereafter. (When productivity increases, it remains at the new level, i.e., the labor demand curve shifts up

and remains up.) As shown for individual 3, regardless of when the given educational experience was acquired, the monetary increment in each time period for each individual is the same, ceteris paribus.

If a cross section study occurs in time period 3, the same labor income for each individual is recorded if educational experiences and other characteristics (e.g, socioeconomic) that determine the magnitude of the change change the same amount for each individual.

The assumption is made that an increase in education leads to higher income. That is, the partial derivative of an income determination model with respect to education is positive. However, when other variables are allowed to change as necessary, this total derivative of the income determination model may be less than, greater than, or equal to zero.

Education raises the productivity of labor (see the first section of this chapter). Since the marginal physical productivity of the labor input times the price of the output represents the labor demand curve, an increase in education shifts the labor demand curve to the right and (given a positively-sloped supply curve) raises wages, ceteris paribus.

The Education Variables: Formal Schooling

Education is a complex combination of experiences, which for preliminary discussion purposes are classified as

formal schooling obtained in public schools and regular four-year colleges, general knowledge acquired which does not directly affect occupational abilities, and specialized knowledge acquired which does relate to abilities to perform a past or current job or occupation. Formal schooling is generally thought to be strongly influenced by parents' (of individual studied) ability and willingness to finance and encourage this part of their child's education (2, p. 53; 23, p. 141; 41, p. 853; 30, p. 225).

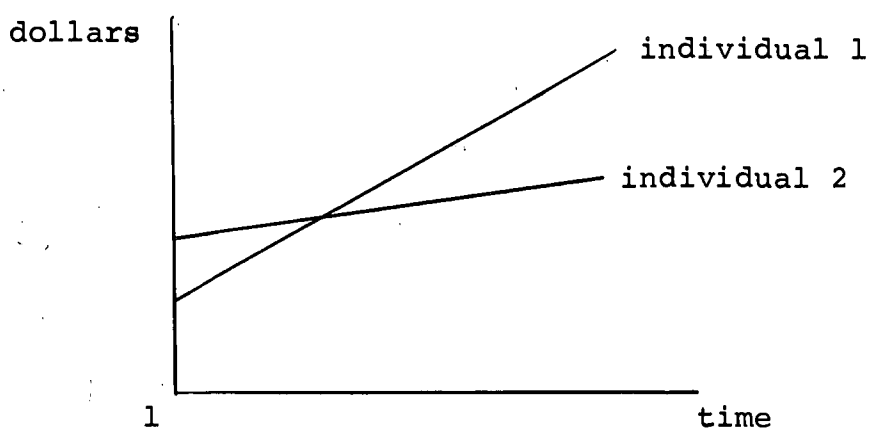
As discussed above, several researchers have reported findings with positive relationships between formal schooling and income (see, for example, 1, 3, 27, 50, 30, 48). Other researchers have not found such a relationship. Christopher Jencks, et al., says "Neither family background, cognitive skill, educational attainment, nor occupational status explain much of the variation in men's income" (23, p. 226). Here, then, is a beginning place for the present study to consider other forms of learning experiences. Although many researchers have focused on formal schooling, relatively few have rigorously investigated informal education. However, informal schooling and other forms of investment in human capital after completion of formal education have been recognized as important in human capital development and income levels (29, p. 8).

Jencks, on the other hand, treated formal schooling as his education variable and ignored other forms of learning experiences.

Certain abilities or competence may have substantial impact on income, but Jencks appeared to favor luck or chance as the principal explanation for residual variation (23, p. 228).

The importance of knowledge attainment directly relevant to current or past occupations was not denied. Indeed, Jencks implied that directly augmenting men's competence in their work might prove fruitful in reducing economic inequality: "Direct efforts to equalize competence would have to focus on the specific skills needed on actual jobs" (23, p. 227). It seems appropriate to repeat the observations of one reviewer of the Jencks book. Thurow indicates that human capital theorists and Jencks are not necessarily in conflict, for these economic theorists "... emphasize the profitable gain for the group" (49, p. 109). Jencks focuses on the riskiness of education for the individual.

To illustrate this point, consider the earnings profiles for two people who differ only with respect to the levels of formal schooling acquired.



Individual 1 has a higher level of formal schooling than Individual 2. Individual 1, in time period 1, attended college. Individual 2 was employed; thus Individual 2's income was greater. At some future time period, Individual 1's income equals, then exceeds, Individual 2's.

For all individuals, there is a probability distribution about the earnings profile. Thus, at some points an individual may appear as part of another group with a different level of schooling. The present research, then, is intended to yield inferences about groups as opposed to individuals. For further discussion of individuals versus groups, see Thurow (cited above) and Becker (3, p, 104).

A final point may be made with respect to the findings of Jencks. Other researchers using the same data (11) as Jencks have obtained apparently different results. Specifically, Morgenstern concluded "...years of schooling appear to exert a strong influence on earnings independent of other variables..." (30, p. 225).

The Education Variables: Non-formal Schooling

Much discussion has centered on the economic effects of various types of education on the hard-core poor and the not-so-poor (e.g., 7). Some research results indicate, for example, that adult basic education programs for the poor are ineffective for improving income (35, p. 93). These types of results increase the desirability of separating

nonformal education along some criteria in attempting to measure effectiveness by type of education.

One possibility is to classify these learning experiences by source rather than content or subject matter of the experience. This is the approach chosen in order to shed some light on the problem as discussed in the last two sections. This study attempts to evaluate the impact on income of vocational training, on-the-job training, job experience, military training, job apprenticeship, correspondence courses, and workshops or training sessions. The eventual aim is to show recognizeable non-formal learning experiences are relevant in explaining labor incomes.

The importance of experience, for example, as an important contribution to the learning process is stated by Sherwin Rosen. Rosen's thesis is that job experiences generally constitute learning opportunities for many workers (34, p. 327-328). The basic principle is that workers possess skills with a certain market value, and their wages reflect the market value of these skills minus the value of a new learning opportunity provided by the employer. A person's job history is comprised of a succession of such work experiences whose learning opportunities decline over time as skill accumulates (34, p. 333). The importance of job experience or job training has been recognized by several works (e.g., 24, p. 4-5; 48, p. 72; 28, p. 50). Job experience is defined as years of total work experience,

rather than years of work experience directly relevant to an individual's current occupation. Prior attempts to use the "directly relevant" definition found little improvement, at least for men, over years of total work experience (25, p. 696).

Non-formal learning experiences may be classified into two categories: specific and general. Specific learning experience as defined herein is knowledge obtained directly applicable to current or past occupations held by the individual acquiring the learning experience. Examples might include on-the-job training, vocational schools, and apprenticeships.

Some learning experiences, however, may not be engaged in for the express purpose of higher pay or a better job. These experiences are herein classified as "general" and include learning experiences which do not qualify as specific as defined above. This includes learning experiences which would otherwise be specific, but which did not turn out to be related to the worker's job history. An example would be a person who takes three months of automobile engine repair, quits, goes to barber college, becomes a barber, and never works on automobile engines.

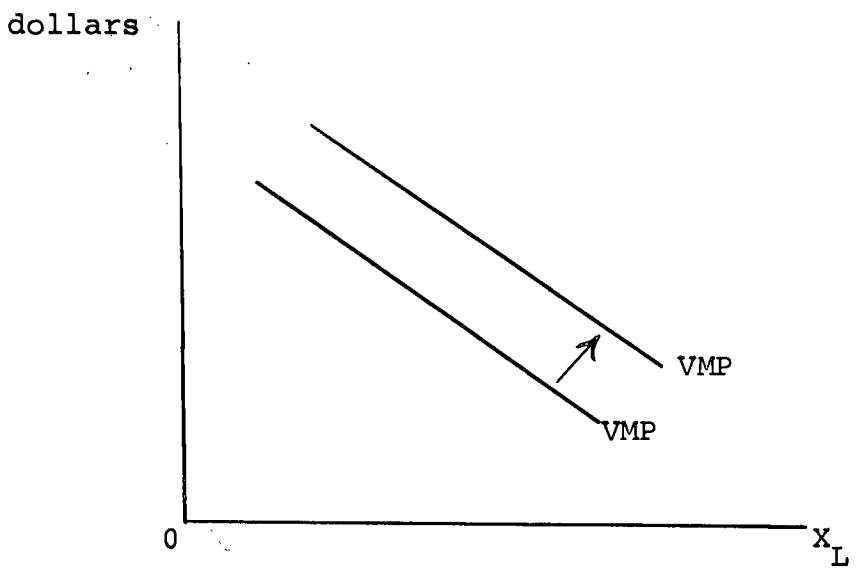
This reasoning cannot be employed, however, to say that general education is economically non-productive. General knowledge acquired which has no apparent direct impact on a person's job history may be of little importance

in reducing income inequality. However, even the most general of liberal arts courses can be considered a mind-expanding experience. To the extent individuals are instilled with increased learning ability, greater communication skills, and otherwise increase their adaptability to new experiences; they may be more able to engage in a progressive series of work experiences (34, p. 337).

Each learning experience of each person must individually be examined in order to determine if the "specific" or "general" label is appropriate. The deciding criterion must be whether the given learning experience is involved in the worker's job history. By observing the description of training received and the occupation-industry history of a worker, a researcher can determine whether the training was specific or general. It may be argued that elements of specific training are to be found in general training and vice-versa, but direct applicability of learning and express purpose of participation (as evidenced by examination of occupation-industry history of each individual) allow some measure of systematic classification by the researcher. Different decisions may be reached by different researchers as to individual cases, but this is assumed a minor difficulty.

The suppliers of labor services are, therefore, assumed to have knowledge pertaining to the demand for their labor services. Based upon this knowledge the

suppliers of labor services in turn consume certain specific learning experiences in accordance with their expectations. As discussed in the first section of this chapter, the derived demand for their labor (VMP) is expected to shift to the right due to the resulting increased productivity.



With a labor supply curve as assumed earlier, wages and annual income rise, ceteris paribus.

This model assumes little about the labor supply function or the exact form of the production function. As stated, it is necessary only that the labor supply function be positively sloped and not perfectly elastic. The production function must yield marginal productivity functions which are negatively sloped over the relevant range.

In such a framework, the principal question may be addressed, and that is whether learning experiences are significant in explaining income levels.

In choosing the non-formal learning experiences, numerous classification systems were considered. It was decided not to classify learning experiences by content, such as automobile repair, bookkeeping, secretarial training, or electronics. Data were gathered which might have allowed this approach and the possibility still exists. Instead, the approach taken was to classify these learning experiences into vocational training, military training, job apprenticeship, and others as discussed above.

Certain of learning experiences were considered and eventually discarded. These included printed technical materials read and media-related items. Upon close examination, these variables seemed to involve tautological or circular arguments and were probably dependent upon income, education, and occupation.

Other Variables of Interest

The current income position of an individual is comprised of two components, a return to the human capital and a return to the non-human capital the individual has at his disposal (8, p. 26). These income categories may be described by

$$Y_T = Y_L + Y_P$$

where

Y_T = current total income before taxes and transfer payments

Y_L = current labor income (e.g., wages salaries and managerial compensation)

Y_P = current property income (e.g., rents and interest)

In this particular research effort, labor income of individuals is of prime concern in that an aim of the project is to focus attention where possible upon variables whose values are subject to modification on the part of local action programs. The type of policy action envisioned (alleviating poverty conditions) is usually not most effective if it is enhancing returns to non-human resources. Therefore, the factors associated with current labor income, Y_L, are of particular interest. These factors, or variables, must be significant in "explaining" labor income distribution and especially the presence of low income (the use of the term "explain" does not necessarily imply "initial causal force"). Thus while establishing relationships among variables, knowledge is obtained which may be of use in implementing, conducting, or evaluating programs.

Other than education as discussed earlier, other factors are assumedly related to labor incomes. Age, race, sex, physical condition, distance from city center, retired, residence, and occupation are included as variables to complete the system.

Age is thought to be positively associated with income (1, 27). This variable is included to capture influences associated with longevity that are not picked up by job experience. For example, a value may be placed on an older worker who is more "mature" and hence more "responsible".

Race may influence income in that nonwhites may be subject to social and economic discrimination. Such discrimination could lead to lower incomes than that received by similarly educated persons of the prevailing racial group (2, 50).

Sex of the income earner might similarly lead to lower income as discrimination is practiced against women (3). In addition, where the family's principal income earner is female, other conditions might exist wherein a lower income is earned. An example might be where a woman with small children or a disabled husband might be required to engage in a lesser-paying occupation than qualified for, in order to care for the children or husband.

Income earners in poor physical condition would be expected to earn lower incomes as their productivity declines (2). Inability to adequately perform tasks routinely required in occupations the person is otherwise qualified for could reasonably be expected to adversely affect labor income.

The further a person resides from a population center and related services, the more likely is his economic

situation to be worse than that of his urban counterpart. This relationship reflects for example, the inaccessibility of many social services and employment. Thus for two individuals otherwise identical, the one living further from the city may be expected to have a lower income. Being geographically removed from the center of population (and therefore economic activity) has been a much-discussed feature of underdeveloped regions (37, 38, 39).

A retired person is likely to be receiving only limited labor income, as such a person no longer works and most likely receives most income in the form of pensions, retirement plans, social security, or investments.

Place of residence is included to discern any relevant difference due to residence. Residences are classified as rural and urban.

Occupation of an employed person is expected to have an effect on his income (1, 27). Occupations that are declining in absolute or relative measures are thought to result in labor incomes below the "going rate" in expanding sectors of the economy. The agricultural worker comes to mind, for his productivity in agriculture is relatively low and the supply of farm workers is thought to be excessive due to low skill requirement. Low skill occupations offer little opportunity for workers to up-grade their skills for advancement. While industry of the employed may be an important descriptive characteristic, mobility of people

between industries is such that occupation, not industry, properly reflects the nature of content of a person's work responsibilities and hence his income. A bookkeeper in a manufacturing plant could probably obtain a comparable job in government, for example. Occupation effects may have another meaning in that certain occupations may command more social prestige and status (33, p. 98-99). Some of the social recognition may be reflected in income levels.

Earlier attempts in this investigation to identify relevant variables uncovered several used in other research, which for various reasons were not used. Economic base of an area, for example, may be significant for some purposes (50). This study concentrated on one area, so the economic area variable would have been the same for all observations. Extreme age, exclusive of the retirement or disability issues, has been postulated as worthy of investigation, principally due to the effect of age discrimination (1). However, these and other variables were not included in the final model, an application of Occam's Razor:

> ...in any system (e.g., an economic model) the number of unconnected propositions and those for which there are no proof should be at a minimum. (19, p. 356)

Somewhat similar was the decision concerning family background. In the initial stages of investigation attention was directed at the effects of socio-economic background. An individual is supposedly greatly influenced by

his family. His education is thereby dependent to some extent upon his parents' ability and willingness to finance and encourage his education (2, p. 53). But this is reflected in his level of formal education and hence is of limited interest given the nature of this study.

A slightly different aspect of family background is skills -- such as farming, automobile repair, or sewing -- acquired in the home and later used in adult employment. Obtaining this information would be quite difficult although superficial efforts were made. The unchangeable or fixed nature of this variable, once again, lessened its appeal for purposes of this study.

III. THE ECONOMIC MODEL

The Model

With a more rigorous concept of education, it is now possible to set forth the model. The specified model is Equation 1:

$$
\begin{aligned}
Y_L = {} & \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \\
& \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \\
& \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \\
& \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \\
& \beta_{16} X_{16} + \beta_{17} PC + \beta_{18} VT_s + \\
& \beta_{19} VT_g + \beta_{20} OJ + \beta_{21} MT_s + \beta_{22} MT_g + \\
& \beta_{23} JA_s + \beta_{24} JA_g + \beta_{25} CC_s + \beta_{26} CC_g + \\
& \beta_{27} OP_s + \beta_{28} OP_g + \beta_{29} WS_s + \beta_{30} WS_g + \\
& \beta_{31} JE + \varepsilon
\end{aligned}
\qquad (1)
$$

where:

Variable Number	Variable Name	Measurement of Variable
Y_L	Labor income	Actual dollars
X_1	Age	Actual years
X_2	Race	0 if Caucasian, 1 otherwise

Variable Number	Variable Name	Measurement of Variable
X_3	Sex	0 if male, 1 otherwise
X_4	Disability	0 if yes, 1 if no
X_5	Distance from city center	Actual miles
X_6	Retired	0 if yes, 1 if no
X_7	Rural	0 if yes, 1 if no
Occupation:		
X_8	Professional, technical & kindred workers	0 if no, 1 if yes
X_9	Managers & administrators, except farm	0 if no, 1 if yes
X_{10}	Sales, clerical & kindred workers	0 if no, 1 if yes
X_{11}	Craftsmen, foremen & kindred workers	0 if no, 1 if yes
X_{12}	Operatives, including transport	0 if no, 1 if yes
X_{13}	Laborers, except farm	0 if no, 1 if yes
X_{14}	Farmers and farm managers	0 if no, 1 if yes
X_{15}	Farm laborers & farm foremen	0 if no, 1 if yes
X_{16}	Service workers, incl. private household	0 if no, 1 if yes
Education:		
$PC(X_{17})$	Public & college schooling	Actual years
$VT_s(X_{18})$	Vocational training, specific	Actual months
$VT_g(X_{19})$	Vocational training, general	Actual months

Variable Number	Variable Name	Measurement of Variable
Education (continued):		
OJ(X_{20})	On-the-job training	Actual months
MT_s(X_{21})	Military training, specific	Actual months
MT_g(X_{22})	Military training, general	Actual months
JA_s(X_{23})	Job apprenticeship, specific	Actual months
JA_g(X_{24})	Job apprenticeship, general	Actual months
CC_s(X_{25})	Correspondence courses, specific	Actual months
CC_s(X_{26})	Correspondence courses, general	Actual months
OP_s(X_{27})	Other programs, specific	Actual months
OP_g(X_{28})	Other programs, general	Actual months
WS_s(X_{29})	Workshops & training sessions, specific	Actual months
WS_g(X_{30})	Workshops & training sessions, general	Actual months
JE (X_{31})	Job experience	Actual years

Labor income (Y_L) was calculated by summing (where applicable) income from salary and wages and self-employment income, including net farm income. Where farm or other self-employment income was present, a discount rate was applied to capital investments in the business. The resulting five percent charge for a return to capital was deducted from labor income. It was assumed coefficients

would be relatively insensitive to variations in the discount rate selected (62, p. 488).

In recognition of the dangers of allowing the data to dictate procedure, the following analytical procedure was established beforehand.

Step 1: Run the single equation model (equation 1) with all variables, paying particular attention to the simple correlation matrix for evidences of multicollinearity.

Step 2: Combine education as follows:

$E_1 = PC$

$E_2 = JE$

$E_3 = VT_s + OJ + MT_s + JA_s + JA_g + OP_s$

$E_4 = VT_g + MT_g + OP_g$

$E_5 = CC_s + WS_s$

$E_6 = CC_g + WS_g$

This step was designed to address problems of multicollinearity and to combine learning experiences into groups where quality and quantity measurements were similar. For example, six months of job apprenticeship may be assumed very similar in quantity and quality to six months on-the-job training.

Also, the ability of respondents and interviewers to distinguish between types of learning experiences might be less than ideal or identical.

The basic equation being evaluated then becomes Equation 2:

$$Y_L = \alpha+\beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \beta_{13}X_{13} + \beta_{14}X_{14} + \beta_{15}X_{15} + \beta_{16}X_{16} + \beta_{32}E_1 + \beta_{33}E_2 + \beta_{34}E_3 + \beta_{35}E_4 + \beta_{36}E_5 + \beta_{37}E_6 + \varepsilon \quad (2)$$

Step 3: Compare the results of step 1 and step 2 and select the equation in which the education variables contribute most to explanation of income. Then examine this equation for evidences of multicollinearity, heteroskedasticity, or other statistical problems. Tests and interpretations of the hypotheses and model would then be appropriate after any required adjustments are made in the model as a result of this examination.

Step 4: As an exploratory quest designed to give impetus to further study, it was decided to eliminate all retired people and women from the sample. Both equations 1 and 2 were then evaluated as in steps 1 and 2. The null hypothesis tested is that there is no difference between the estimated coefficients for education when this subsample is used for estimation. If a difference exists, there may be a measurement problem in the variables, or a conceptual problem for another study, to resolve. It is a possibility that the data-gathering techniques were faulty in that information was obtained from some respondents who were not appropriate respondents for the model as conceptualized. This step was designed to partly compensate for that problem. Retired people or women may be only part-time or casual employees, or perhaps under-employed. Not being as dependent on a full-time labor income, these respondents may not constitute appropriate sample elements, given the objectives of this study.

So that examination of results was not dictating major methodological revisions, completion of step 4 constituted the end of major econometric investigation. Relatively minor revisions in procedure were incorporated as necessary but it was decided ex ante not to consider such procedures as more sophisticated transformations of data, lagged or non-linear variables, or intricate systems of equations. The model specified was believed to provide an acceptable test of the hypotheses of interest.

Hypotheses

Numerous hypotheses were generated in the conceptualization of the problem and in the testing of the model. Some of these are discussed in the section on possibilities for further study.

The hypotheses of relevance in this study are related to the coefficients of the education variables. The null hypotheses are that the coefficients are equal to zero, while the alternate hypotheses indicate the coefficients are greater than zero. In terms of equation 1:

	H_O	H_A
β_{17}	$= 0$	> 0
β_{18}	$= 0$	> 0
β_{19}	$= 0$	> 0
β_{20}	$= 0$	> 0

	H_O	H_A
β_{21}	= 0	> 0
β_{22}	= 0	> 0
β_{23}	= 0	> 0
β_{24}	= 0	> 0
β_{25}	= 0	> 0
β_{26}	= 0	> 0
β_{27}	= 0	> 0
β_{28}	= 0	> 0
β_{29}	= 0	> 0
β_{30}	= 0	> 0
β_{31}	= 0	> 0

In terms of equation 2:

	H_O	H_A
β_{32}	= 0	> 0
β_{33}	= 0	> 0
β_{34}	= 0	> 0
β_{35}	= 0	> 0
β_{36}	= 0	> 0
β_{37}	= 0	> 0

Data for Testing the Model

In order to most effectively test the model, observations on individuals were desired. The model was thought to be appropriate of a mixed economy such as in the United

States. So that an adequate sample of this population could be obtained given budget and other constraints, the study was limited in geographic scope. The geographic unit chosen was a county. Procedures for collecting the data are discussed in Appendix III.

Lane County, Oregon, was selected as the study area because of its internal diversity which increased its value as a "typical" area, and because the county was a Census-designated Standard Metropolitan Statistical Area (SMSA). Relatively abundant secondary data were available for an SMSA, which was useful in designating sampling procedures. Being an SMSA and heterogeneous in natural, human, economic, and public resources, Lane County was thought representative of similar SMSA's throughout the nation.

The county had a population of 215,401 at the time of the 1970 Census of Population (54, p. 1). Approximately half of these persons lived in urban areas in and around the cities of Eugene and Springfield, while the other half were rurally situated in nine other incorporated communities, several unincorporated communities, and in the rural country-side (10, p. 3). These communities and rural living areas were scattered throughout a county which extended from the Pacific Ocean west 120 miles to the Cascade Mountain Range, crossing the Coastal Mountain Range and the northern portion of the heavily populated Willamette Valley, and comprised a land area totaling 4,610 square miles (40, p. 190).

Principal industries included lumbering, forest product manufacturing, agriculture, education, and recreation.

Approximately eight percent of all families in Lane County in 1970 had incomes below the poverty level, with nearly 10 percent of rural nonfarm families below this level (53, pp. 127, 281). Median income of families was $9,332, compared to $9,489 for all Oregon. Over 16 percent of families had incomes exceeding $15,000, as compared to a statewide average of 18 percent.

Median school years completed, at 12.3, was equal to the state average; and 62 percent of persons over 25 years old were high school graduates (54, p. 8).

Less than three percent of the Lane County population was non-Caucasian, with persons of Spanish Language comprising the greater portion of this group (58, p. 52). The majority of non-Caucasians resided in the urbanized portion of the county.

There were about 1,840 farms in Lane County in 1969 (51, p. 161), but only 718 employed persons reported their primary occupation as farmer or farm manager (53, 255). This apparent discrepancy was explained by the many small and part-time farms in the county. Only about 14 percent of farms had sales large enough (above $20,000) to generate significant farm income for family living expenses (51, p. 161). In fact, more of the Lane rural farm employed population indicated an occupation as an operative (including

transport) than as a farmer (53, p. 287). The same was true for the occupation category labeled as craftsmen, foremen, and kindred workers.

IV. RESULTS

First Estimation of the Model

Using the questionnaires obtained through the process described in the appendix, equations 1 and 2 of Chapter III were estimated (Tables 2 and 3). One criteria for evaluating the relative effectiveness of these two equations was the overall "reasonableness" of the education coefficients. Neither equation reflected perfection in this respect, although the method of combining education variables for equation 2 appeared to mask effects of the significant coefficients from equation 1. Because of this lack of increasing interpretive strength, the reasons for using equation 2 were reduced.

The other criterion employed was more substantive. An F-test of the added explanatory power (significant increased value for the coefficient of determination) when adding the education variables to the equation was applied (26, p. 371). On this basis equation 2 was again rejected because of the education variables' lack of contribution to the equation.

$$F = \frac{R_Q^2 - R_K^2}{1 - R_Q^2} \cdot \frac{N - Q}{Q - K}$$

where R_Q^2 = total R^2

R_K^2 = partial R^2, without education variables

Table 2. Empirical Results of Equation 1

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-6879.30	2608.80	-2.64 **
$\beta_1 X_1$	91.51	36.35	2.52 **
$\beta_2 X_2$	300.35	2273.22	0.13
$\beta_3 X_3$	-4796.20	678.09	-7.07 **
$\beta_4 X_4$	1908.60	702.68	2.72 **
$\beta_5 X_5$	-33.42	48.93	-0.68
$\beta_6 X_6$	8676.00	847.97	10.23 **
$\beta_7 X_7$	346.97	975.62	0.36
$\beta_8 X_8$	2443.00	1100.41	2.22 **
$\beta_9 X_9$	2349.10	1077.95	2.18 **
$\beta_{10} X_{10}$	1085.80	971.78	1.12
$\beta_{11} X_{11}$	1931.70	1056.84	1.83 **
$\beta_{12} X_{12}$	811.92	979.25	0.83
$\beta_{13} X_{13}$	1332.50	1224.40	1.07
$\beta_{14} X_{14}$	-5747.30	1921.28	-2.99 **
$\beta_{15} X_{15}$	-688.25	2503.40	-0.27
$\beta_{16} X_{16}$	--	--	--
$\beta_{17} PC$	142.15	100.69	1.41 *
$\beta_{18} VT_s$	66.04	53.78	1.23
$\beta_{19} VT_g$	-199.45	153.86	-1.29
$\beta_{20} OJ$	50.94	44.92	1.13
$\beta_{21} MT_s$	-17.12	131.19	-0.13
$\beta_{22} MT_g$	203.62	92.48	2.20 **

Table 2. continued

Item	Estimated value ($\hat{\beta}$)	Standard error	t
$\beta_{23}JA_s$	-2.58	18.63	-0.14
$\beta_{24}JA_g$	-177.72	144.79	-1.23
$\beta_{25}CC_s$	-34.82	54.27	-0.64
$\beta_{26}CC_g$	-47.63	46.06	-1.03
$\beta_{27}OP_s$	414.25	219.31	1.89 **
$\beta_{28}OP_g$	-162.91	252.54	-0.65
$\beta_{29}WS_s$	151.60	81.21	1.87 **
$\beta_{30}WS_g$	-181.69	256.00	-0.71
$\beta_{31}JE$	-12.77	35.79	-0.36

* Significant at the 0.10 level ($t_{.10,319} = 1.282$).

** Significant at the 0.05 level ($t_{.05,319} = 1.645$)

$R^2 = .576$

Table 3. Empirical Results of Equation 2.

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-8134.40	2617.82	-3.11 **
$\beta_1 X_1$	106.44	36.56	2.91 **
$\beta_2 X_2$	511.87	2191.67	0.23
$\beta_3 X_3$	-4977.80	674.00	-7.39 **
$\beta_4 X_4$	1843.00	705.44	2.61 **
$\beta_5 X_5$	-34.66	49.57	-0.70
$\beta_6 X_6$	8803.00	850.63	10.35 **
$\beta_7 X_7$	552.53	989.59	0.56
$\beta_8 X_8$	2652.70	1105.60	2.40 **
$\beta_9 X_9$	2895.00	1079.89	2.68 **
$\beta_{10} X_{10}$	1073.10	981.95	1.09
$\beta_{11} X_{11}$	1965.50	1052.82	1.87 **
$\beta_{12} X_{12}$	875.69	991.98	0.88
$\beta_{13} X_{13}$	1383.10	1257.86	1.10
$\beta_{14} X_{14}$	-5682.60	1045.78	-2.92 **
$\beta_{15} X_{15}$	-594.70	2545.93	-0.23
$\beta_{16} X_{16}$	--	--	--
$\beta_{32} E_1$	195.41	101.12	1.93*
$\beta_{33} E_2$	-21.12	36.26	-0.58
$\beta_{34} E_3$	10.24	15.98	0.64
$\beta_{35} E_4$	90.44	77.84	1.16
$\beta_{36} E_5$	11.32	44.22	0.26
$\beta_{37} E_6$	-37.50	44.30	-0.85

* Significant at the 0.10 level ($t_{.10,319} = 1.282$)
** Significant at the 0.05 level ($t_{.05,319} = 1.645$)
$R^2 = .546$

N = total degrees of freedom

Q = number of variables in R_Q^2

K = number of variables in R_K^2

Substituting actual values for equation 2,

$$F = \frac{.5463 - .5355}{1 - .5463} \cdot \frac{319 - 21}{21 - 15} = 1.1821$$

Since $F_{\alpha(K,N-Q)} = F_{.05(15,298)} = 1.67$, the null hypothesis was accepted. Adding $E_1, E_2, \ldots E_6$ to the equation contributed nothing to its explanatory power for income.

Substituting actual values for equation 1,

$$F = \frac{.5759 - .5355}{1 - .5759} \cdot \frac{319 - 30}{30 - 15} = 1.836$$

Since $F_{.05(15,289)} = 1.67$, the null hypothesis was rejected, i.e., there was no reason to doubt that addition of education variables PC, $VT_S, \ldots$JE contributed to the explanation of income. Based on these results, equation 1 was selected as the appropriate model.

An additional F-test was performed for occupation variables as a set, to establish their added explanatory power. (A t-test may be performed, as done, but this test only established whether a given occupation was significantly different from the omitted occupation.)

$$F = \frac{.5355 - .4708}{1 - .5355} \cdot \frac{319 - 15}{15 - 7} = 5.2934$$

Since $F_{.05(7,304)} = 2.01$, the null hypothesis was rejected; i.e., there was no reason to reject the hypothesis that

addition of the set of occupation variables added to the explanatory power of the equation.

In the case of the other binary variables, the t-test and F-test give the same results; $t^2_{\alpha/2(n)} = F_{\alpha(1,N)}$. This results because omitting a variable in such a situation leaves only one in the equation.

Transformations were required for the coefficients of the binary variables in equation 1 (Table 2). This was done in order to simplify interpretation of these coefficients for the selected equation. The method was as outlined in Sweeney and Ulveling (45, p. 30). The procedure specified that each coefficient in the model which represents a binary variable be adjusted to reflect differences from the mean of the dependent variable, rather than differences from the omitted variable (omitted to avoid computational problems involving a singular matrix). The resulting equation then has the mean of the dependent variable as the intercept term.

For the set of occupation variables:

$$B_i = b_i + Q$$

where B_i = new coefficient

b_i = old coefficient

and Q is computed from

$$\sum_{i=1}^{N} P_i(b_i + Q) = 0$$

where P_i = portion of sample in occupation i

N = number of occupations

The estimated coefficient of the omitted occupation variable was thus Q, as $b_i = 0$ in the untransformed equation.

Coefficients for the remaining binary variables were similarly transformed by Q, where Q now represents

$$Q = -[P_i \; b_i]$$

where P_i now is the portion of the sample represented in the 0,1 binary variable by "1". Computations of Q are presented in Table 4.

The intercept term is the mean of the dependent variable, and a check is involved in the process of verifying this, as

$$-\sum_{j=1}^{N} Q_j + A = \bar{Y}$$

where Q_j = computed values (Table 4)

A = intercept term (-1165.0) when nonbinary variables are entered as deviations from their mean $(X - \bar{X})$.

$\bar{Y}$ = mean of the dependent variable (7843.4718).

Rounding errors and missing observations resulted in a discrepancy of 41.1149, which was allocated to the individual

Q-values based on the relative size of their contribution to the summation of the Q-values, considering signs in the summation but not in the relative size of contribution. Substituting final values:

$$-(-9008.4717) + (-1165.0) = 7843.4718$$

$$7843.4717 = 7843.4718$$

Transforming the occupation dummy variable set enables interpretation to be relative to mean income rather than the omitted occupation. For 0,1 variables such as sex, the untransformed coefficient indicates how much difference exists between the value represented by 0 and the value represented by 1. The new coefficient is simply $b_i + Q$. For the 0 term, $b_i = 0$ and the coefficient is Q.

Using these results, a transformed equation was constructed (Table 5). Note the inclusion of additional coefficients representing variables omitted (the "0" of the 0,1 binary variables) in equation 1 as presented in Table 2. The coefficient for the "0" part of the binary variable (i.e., caucasian, male, disabled, retired, rural) is the adjusted Q of Table 4. The "1" part is the previous coefficient as transformed by Q.

All tests of significance were on the untransformed results. The equation of Table 5 permits easier interpretation of coefficients (particularly for signs on binary variable coefficients), but is not a proper basis for

Table 4. Values for Transforming Binary Variables for Equation 1.

Binary variable	Estimated value (b_i)	Sample proportion (P_i) 1/	Q	Adjusted Q
β_2	300.35	.0116	-3.4841	-3.5001
β_3	-4796.20	.3052	1463.8002	1470.5114
β_4	1908.60	.8459	-1614.4847	-1621.8870
β_6	8676.00	.8401	-7288.7076	-7322.1258
β_7	346.97	.6686	-231.9841	-233.0477
β_8	2443.00	.144		
β_9	2349.10	.129		
β_{10}	1085.80	.185		
β_{11}	1931.70	.162	-1292.4966	-1298.4225
β_{12}	811.12	.176		
β_{13}	1332.50	.068		
β_{14}	-5747.30	.018		
β_{15}	-688.25	.009		
β_{16}	0	.109		
		ΣQ =	-8967.3569	-9008.4717

1/ Includes a few observations not in the computations of the regression equations.

Table 5. Empirical Results with Transformed Binary Variables for Equation 1

Item	Variable name	Estimated value ($\hat{\beta}$)
α	**Intercept	7843.47
$\beta_1 X_1$	**Age	91.51
$\beta_2 X_2$	Race: caucasian	-3.50
	noncaucasian	296.85
$\beta_3 X_3$	**Sex: male	1470.51
	female	-3325.69
$\beta_4 X_4$	**Disability: disabled	-1621.89
	not disabled	286.71
$\beta_5 X_5$	Distance from city center	-33.42
$\beta_6 X_6$	**Retired: retired	-7322.13
	not retired	1353.9
$\beta_7 X_7$	Residence: rural	-233.05
	urban	113.92
$\beta_8 X_8$	**Professional, technical & kindred workers	1144.58
$\beta_9 X_9$	**Managers & administrators, except farm	1050.68
$\beta_{10} X_{10}$	Sales, clerical & kindred workers	-212.62
$\beta_{11} X_{11}$	**Craftsmen, foremen & kindred workers	633.28
$\beta_{12} X_{12}$	Operatives, including transport	-486.50
$\beta_{13} X_{13}$	Laborers, except farm	34.08
$\beta_{14} X_{14}$	**Farmers and farm managers	-7045.72
$\beta_{15} X_{15}$	Farm laborers & farm foremen	-1986.67

Table 5. continued

Item	Variable name	Estimated value ($\hat{\beta}$)
$\beta_{16}X_{16}$	Service workers, incl. private household	-1298.42
$\beta_{17}PC$	*Public and college schooling	142.15
$\beta_{18}VT_s$	Vocational training, specific	66.04
$\beta_{19}VT_g$	Vocational training, general	-199.45
$\beta_{20}OJ$	On-the-job training	50.94
$\beta_{21}MT_s$	Military training, specific	-17.12
$\beta_{22}MT_g$	**Military training, general	203.62
$\beta_{23}JA_s$	Job apprenticeship, specific	-2.58
$\beta_{24}JA_g$	Job apprenticeship, general	-177.72
$\beta_{25}CC_s$	Correspondence courses, specific	-34.82
$\beta_{26}CC_g$	Correspondence courses, general	-47.63
$\beta_{27}OP_s$	**Other programs, specific	414.25
$\beta_{28}OP_g$	Other programs, general	-62.91
$\beta_{29}WS_s$	**Workshops & training sessions, specific	151.60
$\beta_{30}WS_g$	Workshops & training sessions, general	-181.69
$\beta_{31}JE$	Job experience	-12.77

* Significant at the .10 level (see Table 2).

** Significant at the .05 level (see Table 2).

R^2 = .576

computation of tests of significance or other statistical measures of the appropriateness of the equation.

The transformed coefficients are now interpreted as relative to the mean or intercept. Each set of coefficients should be interpreted together. Take, for example, sex. Males, all other things equal, had a predicted labor income of $9313.98 (7843.47 + 1470.51). Predicted income for females equals $4517.78 (7843.47 - 3325.69). More simply, income of males exceeded that of females and the asterisk indicates the difference was significant.

An interpretation of this equation indicated that of the first seven variables, age, sex, disability, and retired emerged significant and positive as postulated. Race, distance from city center, and residence were insignificant, but the last two had signs indicating postulated relationships. Race, however, had postulated results associated with caucasian-noncaucasian reversed. Being insignificant means little importance should be attached to this difference, but there are reasonable explanations for this result. An explanation might be that (given racial discrimination as a fact) the portion of noncaucasians in the total population was so small that a truly representative cross section was not obtained in the sample (only 1.16 percent of the sample was noncaucasian).

Four occupational categories were significantly different from the mean. Three (professional, technical and

kindred workers; managers and administrators; and craftsmen, foremen, and kindred workers) exerted a positive influence from the mean. Being a farmer or farm manager, however, resulted in a predicted income well below the mean. Directional influences on the occupational categories were generally reasonable.

Four of the 15 items classified as "learning experiences" or education were significant. In these cases, the null hypothesis was rejected and the alternative hypothesis accepted, for the sign was as hypothesized. General military training (MT_g), specific other job training programs (OP_s), and specific workshops or training sessions (WS_s) joined formal schooling (PC) in being significant.

It is interesting to note that two listed as significant were "miscellaneous" in nature. "...Have you ever had other training courses for any line of work?" was the way information was obtained for specific other job training programs (OP_s). In effect the respondent was asked whether the questionnaire was exhausting all identifiable learning experiences. Specific workshops or training sessions (WS_s) were also difficult to characterize beforehand. These learning experiences may tend to be quite specialized in nature, perhaps related as other training (OP_s) closely to daily activities and job responsibilities. Teachers' workshops, short seminars, one-half day workshops, and other brief and directly-applicable learning experiences

were characteristic of both these variables. It is noteworthy that these learning experiences are related to better performance in a given job, rather than preparing for new jobs or occupations.

A guide to possible problems of multicollinearity has been to observe the individual elements of the simple correlation matrix, the r_{ij}'s. A general rule-of-thumb is if the square of the individual r_{ij} (the simple correlation coefficient between x_i and x_j) exceeds .9, one should begin to worry about multicollinearity. The largest r_{ij} in the matrix was .857, which equals .7344 when squared. Based on this result it was assumed the problem of multicollinearity was not present to the extent that specification error should be risked by combining or deleting variables.

Multicollinearity is a problem sometimes difficult to detect by observing correlation coefficients. Some researchers have uncovered instances of serious multicollinearity where simple coefficients gave little indication of the situation (6, p. 394). Hence a more rigorous test for the presence of multicollinearity was sought.

A chi-square test was conducted for the model which indicates whether severe multicollinearity existed. The test is discussed in several references (e.g., 31, p. 379; 20, p. 487).

$$X^2 = - \left[T - 1 - \frac{1}{6} (2K + 5)\right] \left[1 - \sum_{i<j} \sum r_{ij}^2\right]$$

with $\frac{K(K-1)}{2}$ degrees of freedom.

where T = sample size

K = number of independent variables including intercept

r_{ij} = elements of the simple correlation matrix

substituting values for equation 1,

$$X^2 = - [319 - 1 - \frac{1}{6} (2 \cdot 31 + 5)] [1 - 7.212382]$$

$$= 1906.14$$

With $\frac{31(31 - 1)}{2} = 465$ degrees of freedom, the critical value for $X^2_{.05(465)}$ was calculated from Thompson (60, p. 188).

$$X^2_{d.f(\alpha)} = \frac{1}{2} \{y_p = \sqrt{2(d.f.) - 1}\}^2, \quad (y_p = 1.6449)$$

$$= 515.6513$$

Since the calculated X^2 exceeded the critical value of 515.6513, the null hypothesis of severe multicollinearity was rejected. Since a small value of X^2 indicates multicollinearity there appeared to be no reason to suspect the model contained severe multicollinearity.

Second Estimation of the Model

In further evaluating the nature of equation 1, residuals were tabulated by occupation. The variance (s^2) of each group of residuals was then computed, and F-tests conducted to determine whether the variance of the residuals

was constant between occupations (Table 6). The results indicated that while occupation 1 (professional, technical, and kindred workers) and occupation 2 (managers and administrators, except farm) were not significantly different from each other, these two occupation groups were significantly different from the other occupations. With heteroskedasticity the tests of significance do not apply (26, p. 255).

Thus it was appropriate to estimate separate equations for each of the two occupation groups in order to have confidence in the results of the tests of the hypotheses. Since the first estimation of the model did not exhibit desirable characteristics for the residuals, both equations 1 and 2 were reevaluated. Equation 1 was separated into two equations, 1a and 1b, where Equation 1a was Equation 1 using only occupations 1 and 2; and Equation 1b was Equation 1 using only occupations 3 to 9. Similarly, Equation 2 was separated into two equations: 2a for occupations 1 and 2 and 2b for occupations 3 to 9.

Evaluation of the above four equations was consistent with procedure as previously set out in the first section of this chapter: the "reasonableness" of the education coefficients, but more importantly an F-test of the education variables' contribution to the explanatory power of the equation.

In judging whether 1a or 2a, and 1b or 2b, represented the "better" formulation of the model, conclusions were

Table 6. Variance of Residuals by Occupation.

Occupation	Variance (s^2)[1/]	Number of observations
Professional, technical & kindred workers (1).....	28,769,000.90	48
Managers & administrators, except farm (2).....	26,999,514.00	40
Sales, clerical & kindred workers (3).....	10,082,353.60	58
Craftsmen, foremen & kindred workers (4).....	11,407,401.16	52
Operatives, including transport (5).....	10,370,718.34	60
Laborers, except farm (6).	9,854,290.21	22
Farmers & farm managers (7).....	20,729,386.58	6
Farm laborers & farm foremen (8).....	19,088,453.36	3
Service workers, incl. private household (9)....	8,064,982.62	31

[1/] An F-test of the variances $\left\{\frac{s_i^2}{s_j^2}\right\}$ indicated 11 occupations were different from each other: 1 X 3, 1 X 4, 1 X 5, 1 X 6, 1 X 9, 2 X 4, 2 X 3, 2 X 5, 2 X 6, 2 X 9, and 7 X 9. The low number of observations for occupation 7 was assumed sufficient reason to ignore the significance of the F-test between this occupation and occupation 9. Since 7 is different from 9, but not from 8 and 9 is not different from 8, it appeared to be of little importance to be concerned given the low number of observations for 7 and 8.

reached similar to those of choosing between 1 and 2. Equation 2a had one fewer significant coefficients than 1a (Tables 7 and 8). Combining educational variables in 2a resulted in these variables contributing a nonsignificant amount to the explanatory power of the equation (Table 11). Equation 1a significantly increased the explanatory power and appeared the better formulation.

The choice between equations 1b and 2b was similar (Tables 9 and 10). Equation 1b yielded a significant F-value while 2b did not. Further, since combination of the educational variables seemed to be contributing little interpretative power in any formulation of the model, the original reasons for this combination are lessened. Combining learning experiences was intended to address problems of multicollinearity as well as to group learning experiences into groups where quantity and quality measurements were similar (see Chapter III). Multicollinearity appeared an insignificant concern, and the grouping did little good in any of the equations.

Because of concern about sampling problems outlined in Step 4 of the earlier discussed direction of attack, two additional versions of the model were evaluated. The equations were re-estimated in two steps, first deleting retired persons, then retired persons and women.

Equation 1c = Equation 1a minus retired

Equation 1d = Equation 1b minus retired

Table 7. Empirical Results of Equation 1a.

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-14,853.00	7758.78	-1.91 **
$\beta_1 X_1$	85.43	122.73	0.70
$\beta_2 X_2$	5,186.80	8349.17	0.62
$\beta_3 X_3$	-1,999.40	1431.39	-1.40 *
$\beta_4 X_4$	714.04	2596.21	0.28
$\beta_5 X_5$	-149.21	248.34	-0.60
$\beta_6 X_6$	13,299.00	2414.26	5.51 **
$\beta_7 X_7$	426.42	4398.22	0.10
$\beta_8 X_8$	-888.40	1581.51	-0.56
$\beta_9 X_9$	--	--	--
$\beta_{17} PC$	524.20	268.30	1.95 **
$\beta_{18} VT_s$	531.50	175.54	3.03 **
$\beta_{19} VT_g$	-2,085.20	1157.42	-1.80
$\beta_{20} OJ$	259.79	117.87	2.20 **
$\beta_{21} MT_s$	47.23	208.87	0.23
$\beta_{22} MT_g$	141.44	167.04	0.85
$\beta_{23} JA_s$	-94.47	46.73	-2.02
$\beta_{24} JA_g$	-245.69	232.37	-0.63
$\beta_{25} CC_s$	-79.46	111.65	-0.71
$\beta_{26} CC_g$	131.74	115.03	1.15
$\beta_{27} OP_s$	500.39	447.92	-1.12
$\beta_{28} OP_g$	-266.98	528.38	-0.51
$\beta_{29} WS_s$	45.06	120.79	0.37
$\beta_{30} WS_g$	456.06	2415.24	0.19
$\beta_{31} JE$	116.70	119.19	0.98

* Significant only at the 0.10 level ($t_{.10,87} = 1.282$)

** Significant at the 0.05 level ($t_{.05,87} = 1.645$)

$R^2 = .658$

Table 8. Empirical Results of Equation 2a

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-10461.00	7867.17	-1.79 **
$\beta_1 X_1$	74.25	94.73	0.78
$\beta_2 X_2$	1049.70	6474.39	0.16
$\beta_3 X_3$	-2467.20	1465.46	-1.68 **
$\beta_4 X_4$	129.50	2855.31	0.05
$\beta_5 X_5$	-178.53	237.97	-0.08
$\beta_6 X_6$	11624.00	2447.41	4.75 **
$\beta_7 X_7$	1010.20	4293.89	0.24
$\beta_8 X_8$	-1435.30	1645.47	-0.87
$\beta_9 X_9$	--	--	--
$\beta_{32} E_1$	632.82	264.83	2.39 **
$\beta_{33} E_2$	143.34	88.62	1.62 *
$\beta_{34} E_3$	21.03	39.14	0.54
$\beta_{35} E_4$	105.77	178.89	0.59
$\beta_{36} E_5$	-14.22	79.44	-0.18
$\beta_{37} E_6$	15.11	81.24	0.19

* Significant at the 0.10 level ($t_{.10,87} = 1.282$)

** Significant at the 0.05 level ($t_{.05,87} = 1.645$)

$R^2 = .509$

Table 9. Empirical Results of Equation 1b.

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-2557.80	2492.56	-1.03
$\beta_1 X_1$	91.81	34.06	2.70 **
$\beta_2 X_2$	-656.14	2082.39	-0.32
$\beta_3 X_3$	-5772.70	718.32	-8.04 **
$\beta_4 X_4$	1655.20	621.70	2.66 **
$\beta_5 X_5$	-23.92	40.90	-0.58
$\beta_6 X_6$	7552.90	784.11	9.63 **
$\beta_7 X_7$	-190.38	849.14	-0.22
$\beta_{10} X_{10}$	1280.70	811.52	1.58 *
$\beta_{11} X_{11}$	1331.60	903.77	1.47 *
$\beta_{12} X_{12}$	268.80	822.07	0.33
$\beta_{13} X_{13}$	763.65	1032.27	0.74
$\beta_{14} X_{14}$	-6289.20	1572.39	-4.00 **
$\beta_{15} X_{15}$	-1137.10	2014.15	-0.56
$\beta_{16} X_{16}$	--	--	--
$\beta_{17} PC$	20.62	102.74	0.20
$\beta_{18} VT_s$	1.63	48.56	0.03
$\beta_{19} VT_g$	-159.21	126.30	-1.26
$\beta_{20} OJ$	-10.54	43.92	-0.24
$\beta_{21} MT_s$	-33.29	311.22	-0.11
$\beta_{22} MT_g$	231.44	104.41	2.22 **
$\beta_{23} JA_s$	41.82	19.26	2.17 **
$\beta_{24} JA_g$	-276.10	204.45	-1.35

Table 9. continued

Item	Estimated value ($\hat{\beta}$)	Standard error	t
$\beta_{25}CC_s$	-75.05	59.97	-1.25
$\beta_{26}CC_g$	-102.50	67.03	-1.53
$\beta_{27}OP_s$	292.83	417.52	0.70
$\beta_{28}OP_g$	-216.75	284.31	-0.76
$\beta_{29}WS_s$	160.82	194.55	0.83
$\beta_{30}WS_g$	-185.27	209.14	-0.89
$\beta_{31}JE$	-54.92	33.05	-1.66

* Significant at the 0.10 value ($t_{.10,231} = 1.282$)

** Significant at the 0.05 level ($t_{.05,231} = 1.645$)

$R^2 = .648$

Table 10. Empirical Results of Equation 2b.

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-1951.30	2542.35	-0.77
$\beta_1 X_1$	89.61	33.44	2.68 **
$\beta_2 X_2$	-1363.80	2159.53	-0.63
$\beta_3 X_3$	-5672.10	716.32	-7.92 **
$\beta_4 X_4$	1484.40	633.24	2.34 **
$\beta_5 X_5$	-26.38	42.76	-0.62
$\beta_6 X_6$	7203.60	800.79	9.00 **
$\beta_7 X_7$	-228.04	885.82	-0.26
$\beta_{10} X_{10}$	1776.70	828.50	2.14 **
$\beta_{11} X_{11}$	1864.50	905.17	2.06 **
$\beta_{12} X_{12}$	440.63	844.38	0.52
$\beta_{13} X_{13}$	1073.20	1062.23	1.01
$\beta_{14} X_{14}$	-6027.80	1632.59	-3.69 **
$\beta_{15} X_{15}$	-1031.70	2110.44	-0.49
$\beta_{16} X_{16}$	--	--	--
$\beta_{32} E_1$	-1.51	106.25	-0.01
$\beta_{33} E_2$	-57.76	32.30	-1.79
$\beta_{34} E_3$	27.94	17.31	1.61 *
$\beta_{35} E_4$	43.46	80.98	0.54
$\beta_{36} E_5$	-30.88	59.47	-0.52
$\beta_{37} E_6$	-122.65	65.19	-1.88

* Significant at the 0.10 level ($t_{.10,231} = 1.282$)

** Significant at the 0.05 level ($t_{.05,231} = 1.645$)

$R^2 = .589$

Table 11. Education and Added Explanatory Power for Equations 1a, 1b, 2a, and 2b

Item	Equation			
	1a	1b	2a	2b
R^2_Q	.6581	.6477	.5088	.5891
R^2_K	.5022	.6071	.4581	.5721
N	87	231	87	231
Q	23	28	14	19
K	8	13	8	13
F	1.95	1.60	1.26	1.46
$F_{.05(K,N-K)}$	2.10	1.75	2.10	1.75
$F_{.10(K,N-K)}$	1.77	1.55	1.77	1.55

F values are approximate.

For meaning of terms and formula for calculation of F, see paragraph 2 on the first page of this chapter.

Equation 1e = Equation 1c minus women

Equation 1f = Equation 1d minus women

The reason for deleting these sampling units was that it was felt they may have been improperly included in the beginning. In a model purporting to explain labor incomes as related to learning experiences, the current labor income of retired and underemployed (by choice) persons is of a different nature. Retired persons have accumulated a stock of education and this stock related to the labor income derived in the last year of full employment. After retirement, however, labor income becomes only a casual or supplemental form of income, where it is even received. Retired persons in the sample with low or no labor income and relatively high education were thought detrimental to the purposes of this study.

Similarly, persons with other means of financial support could be deleted. It appeared from examination of the questionnaires that a substantial number of women in the sample were underemployed, either full or part time. Since many of these persons had spouses with income, they were deleted. This deletion was intended to roughly approximate, for those sampling units remaining, a group of fully employed persons substantially dependent on labor incomes. Further, remaining sample elements might be more homogeneous regarding expectations relative to the acquisition of income.

Prior to estimating 1c, 1d, 1e, and 1f, Equation 1 was rerun to determine if the elimination of retired persons or women would eliminate the heteroskedasticity between occupations 1 and 2, and the remaining occupations. Removal of these observations was found not to affect earlier conclusions that due to unequal variances of residuals, two separate equations should be estimated. This result indicates a difference in the population between occupations. The difference might be due to any number of factors. One factor could be that the occupations with a higher variance (professional, technical, and kindred; and managers and administrators) view labor income as a residual. There may be a higher portion of people in these two occupations anticipating growth in investments, capital gains, interest earnings, psychic income, or other income not included as labor income. Such individuals may be looked upon as maximizing not labor incomes, but total income or even total "utils".

Briefly, equation 1c and 1d (retired persons removed from sample) appeared to offer insubstantial improvement (Tables 12 and 13). In Equation 1c some non-education coefficients became nonsignificant when compared with 1a, although the effect of the significant educational variables remained about the same. Of particular interest is the strong F-test for addition of formal schooling and job experience (Table 14).

Table 12. Empirical Results for Equation 1c.

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-4935.00	8323.47	-0.59
$\beta_1 X_1$	79.23	186.68	0.42
$\beta_2 X_2$	9344.30	10245.32	0.91
$\beta_3 X_3$	-1486.20	1670.51	-0.89
$\beta_4 X_4$	1290.70	3131.51	0.41
$\beta_5 X_5$	-283.05	302.82	-0.93
$\beta_7 X_7$	-510.07	5377.11	-0.09
$\beta_8 X_8$	-877.99	1828.60	-0.51
$\beta_9 X_9$	--	--	--
$\beta_{17} PC$	576.54	319.31	2.37 **
$\beta_{18} VT_s$	569.35	202.28	2.81 **
$\beta_{19} VT_g$	-1506.90	1607.75	-0.94
$\beta_{20} OJ$	244.48	136.51	1.79 **
$\beta_{21} MT_s$	-243.40	314.31	-0.77
$\beta_{22} MT_g$	129.37	183.83	0.70
$\beta_{23} JA_s$	-80.23	50.76	-1.58
$\beta_{24} JA_g$	-181.18	250.94	-0.72
$\beta_{25} CC_s$	-19.39	159.46	-0.12
$\beta_{26} CC_g$	110.60	144.68	0.76
$\beta_{27} OP_s$	-572.15	603.52	-0.95
$\beta_{28} OP_g$	-316.57	580.80	-0.55
$\beta_{29} WS_s$	64.51	135.47	0.48
$\beta_{30} WS_g$	1518.50	2429.96	0.52
$\beta_{31} JE$	69.40	183.20	0.92

* Significant at the 0.10 level ($t_{.10,74} = 1.282$)

** Significant at the 0.05 level ($t_{.05,74} = 1.645$)

$R^2 = .567$

Table 13. Empirical Results for Equation 1d.

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	6140.90	2773.69	2.21 **
$\beta_1 X_1$	7.46	51.68	0.14
$\beta_2 X_2$	-88.24	2146.28	-0.04
$\beta_3 X_3$	-6131.70	813.74	-7.54 **
$\beta_4 X_4$	1609.80	753.07	2.14 **
$\beta_5 X_5$	13.87	46.37	0.30
$\beta_7 X_7$	-41.65	935.64	-0.04
$\beta_{10} X_{10}$	1414.10	974.08	1.45 *
$\beta_{11} X_{11}$	1325.90	1090.67	1.22
$\beta_{12} X_{12}$	105.56	1017.77	0.10
$\beta_{13} X_{13}$	897.23	1267.72	0.71
$\beta_{14} X_{14}$	-9189.90	1973.66	-4.66 **
$\beta_{15} X_{15}$	-4285.90	2573.62	-1.67 **
$\beta_{16} X_{16}$	--	--	--
$\beta_{17} PC$	36.76	119.83	0.31
$\beta_{18} VT_s$	-37.83	58.07	-0.65
$\beta_{19} VT_g$	-141.23	129.27	-1.09
$\beta_{20} OJ$	-18.19	45.46	-0.40
$\beta_{21} MT_s$	-180.50	318.41	-0.57
$\beta_{22} MT_g$	201.13	106.30	1.89 **
$\beta_{23} JA_s$	34.03	20.86	1.63 *
$\beta_{24} JA_g$	-289.07	209.86	-1.38
$\beta_{25} CC_s$	-67.31	63.23	-1.06
$\beta_{26} CC_g$	-72.52	69.38	-1.05
$\beta_{27} OP_s$	497.73	430.46	1.16
$\beta_{28} OP_g$	-133.53	291.31	-0.46
$\beta_{29} WS_s$	120.97	245.89	0.49
$\beta_{30} WS_g$	4.07	249.96	0.02
$\beta_{31} JE$	48.60	54.25	0.90

* Significant at the 0.10 level ($t_{.10(193)} = 1.282$)

**Significant at the 0.05 level ($t_{.05(193)} = 1.645$)

$R^2 = .576$

Table 14. Education and Added Explanatory Power for Equations 1c and 1d

Item	Equation	
	1c	1d
R^2 before PC & JE	.342	.535
R^2 after PC & JE	.430	.538
N	74	193
Q	9	14
K	7	12
F	5.018	0.5818
$F_{.05(K,N-K)}$	2.17	1.92
$F_{.10(K,N-K)}$	1.82	1.66
R^2 before VT_s thru WS_g	.430	.538
R^2 after VT_s thru WS_g	.567	.576
N	74	193
Q	22	27
K	9	14
F	1.2656	1.1442
$F_{.05(K,N-K)}$	2.04	1.75
$F_{.10(K,N-K)}$	1.74	1.55

F values are approximate.

For meaning of terms and formula for calulcations of F, see paragraph 2 on the first page of this chapter.

Equation 1d appeared to be less changed (Table 13) when compared to 1b insofar as significant coefficients were concerned. However, results of the F-test for improved explanatory power were negative.

It appears from this brief look that elimination of retired persons offered little improvement over all. Elimination of retired persons or more careful specification of the manner in which treated or measured is perhaps conceptually appropriate. Unfortunately this study did not adequately recognize this fact in the data collection stage.

Equations 1e and 1f (women and retired persons removed) was likewise of little improvement (Tables 15 and 16). Comparing 1e and 1a indicated that in addition to losing significance for noneducation variables, one of the education variables became insignificant. Equation 1f also offered little improvement, but one educational variable did become significant.

An attempt was made at this point to once again combine education variables into E_1 to E_6. Results were as before; this combination offered no improvement. There appears to be some significant effect of the nonformal education variables, evidenced by the F values for what might be termed the "labor occupations: as represented by 1b, 1d, and 1f. With an insignificant but large F value, one wonders if the sampling problem were absent, what would happen? Also, if a better or more appropriate classification scheme were

Table 15. Empirical Results for Equation 1e

Item	Estimated value ($\hat{\beta}$)	Standard error	t
α	-3940.10	13445.78	-0.29
$\beta_1 X_1$	260.33	389.59	0.67
$\beta_2 X_2$	1468.90	32093.87	0.05
$\beta_4 X_4$	1368.90	3908.07	0.35
$\beta_5 X_5$	-520.67	523.68	-0.99
$\beta_7 X_7$	-2313.10	8000.47	-0.29
$\beta_8 X_8$	-380.61	2448.66	-0.16
$\beta_{17} PC$	608.02	452.02	1.35 *
$\beta_{18} VT_s$	488.26	244.82	1.99 **
$\beta_{19} VT_g$	-2317.20	2383.35	-0.97
$\beta_{20} OJ$	148.50	436.57	0.34
$\beta_{21} MT_s$	-159.46	375.82	-0.42
$\beta_{22} MT_g$	105.51	220.80	0.48
$\beta_{23} JA_s$	-55.52	61.59	-0.90
$\beta_{24} JA_g$	-234.83	296.85	-0.79
$\beta_{25} CC_s$	27.60	200.83	0.14
$\beta_{26} CC_g$	176.13	199.53	0.88
$\beta_{27} OP_s$	-169.45	2569.17	-0.07
$\beta_{28} OP_g$	-356.86	1222.91	-0.29
$\beta_{29} WS_s$	-66.68	195.61	-0.34
$\beta_{30} WS_g$	1876.30	3430.34	0.55
$\beta_{31} JE$	0.43	369.05	0.001

* Significant at the 0.10 level ($t_{.10(53)} = 1.282$)

** Significant at the 0.05 level ($t_{.05(53)} = 1.645$)

$R^2 = .558$

Table 16. Empirical Results for Equation 1f

Item	Estimated value ($\hat{\beta}$)	Standard error	t	
α	2359.90	3794.94	0.62	
$\beta_1 X_1$	206.36	112.90	1.83	**
$\beta_4 X_4$	1982.70	956.03	2.07	**
$\beta_5 X_5$	44.12	64.61	0.68	
$\beta_7 X_7$	436.83	1288.16	0.34	
$\beta_{10} X_{10}$	-96.11	1718.56	-0.06	
$\beta_{11} X_{11}$	428.33	1577.91	0.27	
$\beta_{12} X_{12}$	-281.35	1549.99	-0.18	
$\beta_{13} X_{13}$	400.92	1725.58	0.23	
$\beta_{14} X_{14}$	-9666.60	2431.52	-3.98	**
$\beta_{15} X_{15}$	-4508.40	2957.92	-1.52	*
$\beta_{16} X_{16}$	--	--	--	
$\beta_{17} PC$	-21.75	154.36	-0.14	
$\beta_{18} VT_s$	-57.73	68.08	-0.85	
$\beta_{19} VT_g$	-196.64	173.95	-1.13	
$\beta_{20} OJ$	8.16	55.14	0.15	
$\beta_{21} MT_s$	-60.82	353.88	-0.17	
$\beta_{22} MT_g$	205.62	120.00	1.71	**
$\beta_{23} JA_s$	44.30	23.34	1.90	**
$\beta_{24} JA_g$	-363.30	235.60	-1.54	
$\beta_{25} CC_s$	-71.60	71.71	-1.00	
$\beta_{26} CC_g$	-49.47	111.09	-0.45	
$\beta_{27} OP_s$	986.13	709.85	1.39	*
$\beta_{29} WS_s$	-75.57	302.87	-0.25	
$\beta_{30} WS_g$	-607.11	876.68	-0.69	
$\beta_{31} JE$	-138.57	112.74	-1.23	

* Significant at the 0.10 level ($t_{.10(138)} = 1.282$)

** Significant at the 0.05 level ($t_{.05(138)} = 1.645$)

$R^2 = .358$

Table 17. Education and Added Explanatory Power for Equations 1e and 1f

Item	Equation	
	1e	1f
R^2 before PC and JE	.364	.272
R^2 after PC and JE	.422	.277
N	53	138
Q	8	12
K	6	10
F	2.2568	0.4347
$F_{.05(K,N-K)}$	2.34	1.91
$F_{.10(K,N-K)}$	1.93	1.65
R^2 before VT_s thru WS_g	.422	.277
R^2 after VT_s thru WS_s	.588	.358
N	53	138
Q	21	24
K	8	12
F	0.7574	1.3289
$F_{.05(K,N-K)}$	2.18	1.83
$F_{.10(K,N-K)}$	1.83	1.60

F values are approximate.

For meaning of terms and formula for calucations of F, see paragraph 2 on the first page of this chapter.

devised for nonformal education, would more positive results emerge?

In several formulations of the model the nonformal education variables individually were insignificant on the whole, but when added as a set increased the explanatory power. In an exploratory run, variables in equations 1e and 1f were allowed to drop out of the equation in a backwards stepwise regression. This procedure allows the variable contributing the least to the explanatory power of the equation to drop. For equation 1e, seven variables were dropped before the stepwise procedure was stopped, and the coefficient of determination declined from .558 to .556, a decline of only .002. A rough approximation of the effect on the F value when adding education variables indicated a possible increase closer to the significant level. For equation 1f, five variables were deleted, the coefficient of determination dropped from .3575 to .3569. The F value was difficult to approximate but might have increased somewhat closer to the critical level. In both of these cases, the number of significant coefficients was not increased by deletion of the variables.

Pursuing this tangent might be fruitful for other researchers, but entered the realm of hypothesis generation for this study. A respecification of the model deleting inappropriate non-education variables and stratifying the sample on pre-selected non-formal education variables to

increase the observations on these variables might constitute an important study.

There remained other interesting manipulations of the data, including removal of persons with non-labor income and persons with no non-formal educational experiences. While hypothesis generating is a valid endeavor, it was felt time would be better spent in testing hypotheses and explaining results.

Equation 1a and 1b were taken as best for explanation of results and formal testing of the hypotheses. Although some problems remain with these formulations, as discussed above, it was not possible to improve the equations without risking serious criticism of embarking upon a "fishing trip".

At this point equations 1a and 1b were accepted as more appropriate formulations upon which further analysis was based. It may have been possible to justify hypotheses testing on 1c, 1d, 1e, or 1f, given results above. Since these later formulations apparently failed to compensate for sampling and measurement problems, and since 1a and 1b afforded about the same interpretative ability, 1a and 1b were selected as appropriate for formal testing of hypotheses.

Testing the Model

Repeating the hypotheses stated in Chapter III, for both equations 1a and 1b:

$$H_o: \quad \beta_{17}, \beta_{18} \cdots \beta_{31} = 0$$

$$H_A: \quad \beta_{17}, \beta_{18} \cdots \beta_{31} > 0$$

For equation 1a, β_{17}, β_{18}, and β_{20} were highly significant and thus the null hypothesis was rejected and the alternative accepted (Table 7). Formal schooling, specific vocational training, and on-the-job training have a positive significant effect upon labor income for professional, technical, and kindred workers; and managers and administrators. The coefficients of other educational variables were insignificant, hence no difference from zero in the sample being evaluated. Other null hypotheses for equation 1a were accepted: these variables had no effect.

For equation 1b, β_{22} and β_{23} were highly significant, causing rejection of the null hypothesis and acceptance of the alternative hypothesis (Table 9). General military training and job apprenticeship were positively and significantly related to labor income for the occupations of equation 1b. The coefficients of other variables were not significantly different from zero.

In order to more fully interpret the model, a transformation of equations 1a and 1b was conducted as done above for equation 1 (Tables 4 and 5). Using the values presented in Tables 18 and 19, the transformed equations for equation 1a and 1b were prepared.

Table 18. Values for Transforming Binary Variables for Equation 1a

Binary variable (b_i)	Estimated value (b_i)	Sample proportion (P_i) 1/	Ω	Adjusted Ω
β_2	5186.80	.0106	-54.98	-53.33
β_3	-1999.40	.3085	616.81	598.30
β_4	714.04	.8936	-638.07	-618.90
β_6	13299.00	.8617	-11459.75	-11115.60
β_7	426.42	.7447	-317.56	-308.01
β_8	-888.40	.4681	415.86	403.36

1/ May include a few observations not in regression calculations $\bar{Y}$ = 9967.39, A = -1126.80

Table 19. Values for Transforming Binary Variables for Equation 1b

Binary variable (b_i)	Estimated value (b_i)	Sample proportion (P_i) 1/	Q	Adjusted Q 2/
β_2	-656.14	.0123	8.0705	10.412
β_3	-5772.70	.2992	1727.1918	2135.8708
β_4	1655.20	.8279	-1370.3401	-1694.6475
β_6	7522.90	.8361	-6289.8967	-7778.2865
β_7	-190.38	.5656	107.6789	133.1752
β_{10}	1280.70	.2582		
β_{11}	1331.60	.2336		
β_{12}	268.80	.2500	612.2501	757.0984
β_{13}	763.65	.0943		
β_{14}	-6289.20	.0246		
β_{15}	-1137.10	.0123		
β_{16}	0	.1270		

1/ May include a few observations not in regression calculations.
$\bar{Y}$ = 7045.9184, A = 609.17

2/ The allocation procedure for adjusting Q is presented earlier in conjunction with equation 1 in the preceding section. In the case of equation 1b this procedure resulted in the transformed coefficients for "not disabled" and "not retired" being negative (Table 24). These coefficients should be positive. Imperfections in the allocation procedure gave rise to this phenomenon, which is assumed relatively minor given the small size of the coefficients and the standard error, which renders the coefficients not significantly different from zero. In addition, the relationship between "retired" and "not retired" is assumed to be preserved by the allocation, as is the relationship between "disabled" and "not disabled".

Interpreting the Model

For ease in referring to the equations 1a and 1b, these two shall be referred to as "white collar" and "labor" occupations, respectively. These terms loosely refer to the tendency for the more physically-demanding occupations to be grouped with the occupations of equation 1b.

Equation 1a for professional, technical, and kindred workers together with managers and administrators (white collar occupations) indicated a mean income (intercept term) of $9967.39 (Table 20). The estimated coefficient on the sex variable indicated that a male will have a predicted income, ceteris paribus, of $598.30 above the mean, or $10,565.69. A female will receive an income $1,401.10 below the mean. The other significant non-education variable was that indicating whether the respondent had retired. The estimated value of the coefficient for that variable indicated that a person in this occupation group who is not retired could expect an income $2,183.40 above the mean income of the group.

Race for the white collar occupations was the only non-education variable to have signs on the coefficients other than expected. Two considerations, however, dismissed any concern. First, race is statistically insignificant, and interpreting the sign on an insignificant variable is a questionable procedure. Second, the limited number of

Table 20. Empirical Results with Transformed Binary Variables for Equation 1a

Item		Variable name	Estimated value ($\hat{\beta}$)
α	**	Intercept	9967.39
$\beta_1 X_1$		Age	85.43
$\beta_2 X_2$		Race: caucasian	-53.33
		noncaucasian	5133.4700
$\beta_3 X_3$	*	Sex: male	598.30
		female	-1401.10
$\beta_4 X_4$		Disability: disabled	-618.90
		not disabled	95.14
$\beta_5 X_5$		Distance from city center	-149.21
$\beta_6 X_6$	**	Retired: retired	-11115.60
		not retired	2183.40
$\beta_7 X_7$		Residence: rural	-308.01
		urban	118.41
$\beta_8 X_8$		Professional, technical & kindred workers	-485.04
$\beta_9 X_9$		Manager & administrators, except farm	403.36
$\beta_{17} PC$	**	Public and college schooling	524.20
$\beta_{18} VT_s$	**	Vocational training, specific	531.50
$\beta_{19} VT_g$		Vocational training, general	-2085.20
$\beta_{20} OJ$	**	On-the-job training	259.79
$\beta_{21} MT_s$		Military training, specific	47.23
$\beta_{22} MT_g$		Military training, general	141.44

Table 20. continued

Item	Variable name	Estimated value ($\hat{\beta}$)
$\beta_{23}JA_s$	Job apprenticeship, specific	-94.47
$\beta_{24}JA_g$	Job apprenticeship, general	-245.69
$\beta_{25}CC_s$	Correspondence courses, specific	-79.46
$\beta_{26}CC_g$	Correspondence courses, general	131.74
$\beta_{27}OP_s$	Other programs, specific	-500.39
$\beta_{28}OP_g$	Other programs, general	-266.98
$\beta_{29}WS_s$	Workshops & training sessions, specific	45.06
$\beta_{30}WS_g$	Workshops & training sessions, general	456.06
$\beta_{31}JE$	Job experience	116.70

* Significant at the 0.10 level ($t_{.10,87} = 1.282$)

** Significant at the 0.05 level ($t_{.05,87} = 1.645$)

$R^2 = .658$

observations on non-Caucasians -- only four were in the sample -- may have introduced sampling error.

Five of the non-education variables were statistically insignificant for the white-collar occupations. The insignificance of race may be dismissed as above, in that only four non-Caucasians were included in the sample. Age, disability, distance from city center, and residence had been included in the model in anticipation of contributing to the explanatory power of the equation. While age was not significant for the white collar equation, it was significant for the labor equation (Table 21). This might indicate that for labor occupations, the age variable is picking up some form of learning experience acquired over time not being otherwise accounted for in the specification of the model.

Disability was not significant for white collar occupations, but was for labor occupations. Perhaps this can be partially explained by a tendency towards greater physical demands characteristic of some of the "labor" occupations.

The insignificance of distance and residence indicates that for the geographic area sampled it matters little where one lives insofar as income levels are concerned. This may be explained partially by the diffused nature of the economic base in the study area. To a large degree, the study area is dependent upon the forest products industry, and much lumber processing is performed in rural areas.

Table 21. Empirical Results with Transformed Binary Variables for Equation 1b

Item		Variable name	Estimated value ($\hat{\beta}$)
α		Intercept	7045.92
$\beta_1 X_1$	**	Age	91.81
$\beta_2 X_2$		Race: caucasian	10.04
		noncaucasian	-646.10
$\beta_3 X_3$	**	Sex: male	2135.87
		female	-3636.83
$\beta_4 X_4$	**	Disability: disabled	-1694.65
		not disabled	-39.45
$\beta_5 X_5$		Distance from city center	-23.92
$\beta_6 X_6$	**	Retired: retired	-7778.29
		not retired	-255.39
$\beta_7 X_7$		Residence: rural	133.18
		urban	-57.20
$\beta_{10} X_{10}$	*	Sales, clerical & kindred workers	2037.80
$\beta_{11} X_{11}$	*	Craftsmen, foremen & kindred workers	2088.70
$\beta_{12} X_{12}$		Operatives, including transport	1025.90
$\beta_{13} X_{13}$		Laborers, except farm	1510.75
$\beta_{14} X_{14}$	**	Farmers & farm managers	-5532.10
$\beta_{15} X_{15}$		Farm laborers & farm foremen	-380.00
$\beta_{16} X_{16}$		Service workers, incl. private household	757.10
$\beta_{17} PC$		Public and college schooling	20.62

Table 21. continued

Item	Variable name	Estimated value ($\hat{\beta}$)
$\beta_{18}VT_s$	Vocational training, specific	1.63
$\beta_{19}VT_g$	Vocational training, general	-159.21
$\beta_{20}OJ$	On-the-job training	-10.54
$\beta_{21}MT_s$	Military training, specific	-33.29
$\beta_{22}MT_g$	** Military training, general	231.44
$\beta_{23}JA_s$	** Job apprenticeship, specific	41.82
$\beta_{24}JA_g$	Job apprenticeship, general	276.10
$\beta_{25}CC_s$	Correspondence courses, specific	-75.05
$\beta_{26}CC_g$	Correspondence courses, general	-102.50
$\beta_{27}OP_s$	Other programs, specific	292.83
$\beta_{28}OP_g$	Other programs, general	-216.75
$\beta_{29}WS_s$	Workshops & training sessions, specific	160.82
$\beta_{30}WS_g$	Workshops & training sessions, general	-185.27
$\beta_{31}JE$	Job experience	-54.92

* Significant at the 0.10 level ($t_{.10,231} = 1.282$)

** Significant at the 0.05 level ($t_{.05,231} = 1.645$)

$R^2 = .648$

Variables for the two occupation categories encompassing the white collar workers had insignificant coefficients, indicating neither was significantly different from mean income. In other words, the two occupations were substantially alike in explaining income levels.

Three educational variables were significant for equation 1a: public and college schooling, specific vocational training, and on-the-job training. An increase in any of these variables is associated with an increase in income.

As public and college schooling were important for the white collar and not the labor occupations, it appears further appropriate that these two occupation groups be analyzed separately. Many white collar occupations may be thought of, perhaps, as requiring certain entrance standards best satisfied by a high school diploma and college degree. Thus, for a person wishing to enter certain white collar occupations, a college degree may be necessary to qualify for consideration by the employer. A degree, then, serves as a screening mechanism as well as an indication of basic knowledge or competence.

Specific vocational training might also be interpreted in the same fashion, as furnishing the prospective employee with credentials which serve perhaps both as screening devices and indications of ability. On-the-job training may indicate the employer's need to impart detailed information or skills which are necessary in performing specific tasks

in the job. Further, on-the-job training may serve as a means of upward mobility on the job.

In equation 1b (labor occupations) age, sex, disability, and retired were highly significant (Table 21). The above discussion on the white collar occupations indicated possible relationships between the two sets of occupations as represented in Tables 20 and 21. It should be further indicated that sex of the income earner was more significant for the labor occupations, perhaps indicating more inclination towards sex discrimination, perhaps reflecting the physically-demanding features of certain occupations.

Three occupation categories were significantly different from mean income. Increasing income above the mean were sales, clerical, and kindred workers; and craftsmen, foremen, and kindred workers. These occupations may represent the more skilled groups of the labor occupations, thus receiving greater incomes. A farmer or farm manager had a predicted income significantly below the mean. Two considerations are noteworthy: farmers had low current labor incomes, and perhaps relatively more of their income was derived in non-labor forms.

Of the education variables, general military training and job apprenticeship were highly significant, contributing positively to labor income. Others were not significant.

It is interesting to note that for labor occupations, general military training, for example, was highly

significant. Perhaps military learning experiences were notable for instilling in individuals some attribute found desirable by employers. The ability to take orders, job discipline, or basic skills might be on such a list of attributes. Further, a military background may well serve as does a college degree for the white collar occupations, in that prospective employees may find their search for a job enhanced by military experience. The satisfactory completion of service in the military may constitute an element in the conscious or unconscious screening process by prospective employers.

It has been stated above that certain learning experiences may satisfy certain screening procedures utilized by employers. Further study could explain much by separating the effects of educational experiences into those which increase productivity and those which help provide certification.

The significance of job apprenticeship for labor occupations may perhaps be ascribed to a pre-existing job opportunity and restricted entry for occupations utilizing job apprenticeships. For white collar occupations, job apprenticeships may not be available as means of labor market entry, thus explaining their insignificant effect for these occupations. Indeed, a surrogate for job apprenticeship as a means of job entry may, in the white collar occupations, be formal education.

The means by which members of the two occupation groups received their total stock of relevant education may be different. While white collar workers did experience military service, this variable is insignificant, though for the labor occupations, military learning appeared significant. For white collar occupations, formal schooling may be the more appropriate indication of competence, or evidence of acceptable certification. For the labor occupations, however, other means of qualifying for a job are utilized, including the presence of military service.

In general, the differences between these two equations may be explained by the differences in occupations represented. For white collar workers, these occupations are not as likely to be physically demanding. The insignificant coefficients for age and disability as contrasted to significant coefficients in the labor occupations, bear this out. The significance of public and college schooling in white collar as contrasted to labor occupations would seem to indicate a greater requirement for formal schooling in the occupations depicting white collar workers. As mentioned earlier, the size of the coefficients for sex may indicate less sex discrimination in the white collar occupations.

The general inability of the equations to uncover significance of many education variables may be laid to the insignificance of these variables in explaining income.

Reaching such a conclusion, however, was not warranted by the results. As indicated before, some results seemed to indicate systematic effects not being picked up when estimating individual coefficients. The failure to find significance for the combinations E_1, $E_2 \ldots E_6$ merely indicated that such a combination was inappropriate, not that no combination existed. In theory there exists a variable described as that portion of human capital stock comprised of non-formal learning experiences. In practice this variable is nonexistent now. A principal components approach to constructing such a variable may contribute much to practical application.

Descriptive Results

By way of further explanation of the sample, descriptive tables of the respondents were compiled. These tables are presented here and in Appendix I.

Of a total of 412 interviews with respondents, 344 usable questionnaires were obtained. The 68 unusable questionnaires comprised principally of refusals to participate and some recent graduates of high school or college who had been employed only recently and had no 1972 income.

A brief summary of social and economic characteristics of the sample is presented in Tables 22 to 25. Extensive cross tabulations of data for the sample are presented in Appendix I and partially discussed below in conjunction with Tables 22 to 25.

The average age for the sample was 45.7, with about 47 percent falling below the average and the rest above (Table 22). As might be expected, relatively more younger respondents were in the lower income categories, possibly because of their relatively low accumulation of human capital (Appendix Table 1).

Table 22. General Characteristics of Respondent

Item	Total respondents	Percent
Age: under 20	1	.29
20-24	27	7.84
25-29	42	12.20
30-34	34	9.88
35-39	34	9.88
40-44	23	6.69
45-49	34	9.88
50-54	40	11.63
55-59	32	9.30
60-64	34	9.88
65-69	17	4.94
70 and over	26	7.57
Total	344	100.00
Average	45.7 years	
Sex: Male	239	69.48
Female	105	30.52
Total	344	100.00
Race: Caucasian	340	98.84
Black	3	.87
Other	1	.29
Total	344	100.00
Disability: Yes	53	15.41
No	291	84.59
Total	344	100.00
Retired: Yes	55	15.99
No	289	84.01
Total	344	100.00
Location of Residence:		
Central city	118	34.30
City suburb	110	31.98
(urban)	(228)	(66.28)
Small community	5	1.45
Open countryside	104	30.23
Farm	7	2.03
(rural)	(116)	(33.71)
Total	344	100.00

Table 22. continued

Item	Total respondents	Percent
Years in Area:		
less than 1.....	34	9.88
1 to 4.....	65	18.90
5 to 9.....	49	14.24
10 to 14.....	49	14.24
15 or more.....	147	42.73
Total.....	344	100.00

Totals may not add to 100 percent due to rounding.

Just over 30 percent of the questionnaires were completed by women. A relatively large proportion of females were in the lower income categories, and females outnumber males in the relatively low-paying sales, clerical, and service occupations (Appendix Tables 2 and 3).

Few noncaucasians were contained in the sample. The noncaucasians were not retired, they were working in various occupations, mostly urban, and generally in the lower income categories (Appendix Table 4).

Over 15 percent of the respondents reported some form of disability which had affected their job. The greatest number of disabled workers were in occupations which might entail relatively greater physical activity: operatives; craftsmen and foremen; and sales and clerical workers (Appendix Table 5).

About 16 percent of those interviewed were retired. Retired persons were found in all occupations, and relatively more lived in rural areas (Appendix Table 5).

Urban residents comprised two-thirds of the sample, being about equally split between suburban and central city dwellers. By far the most rural residents were living in open countryside rather than on a farm or small community. A visual examination indicated income distributions were not strikingly different between rural and urban residents (Appendix Table 8).

Thirty-five percent of the respondents received income below $5,000, while nearly 20 percent were below $1,000 (Table 23 and Appendix Table 9). The high percentage of low-income respondents is partially accounted for by retired persons who were not necessarily poor, for these data did not include income from pensions, social security, investments, and similar forms of income. Farm income was reported by 16 respondents, while only six indicated their occupation as farmer or farm manager. This apparant discrepancy was explained by several part-time farm operations, where the primary occupation of the respondent was nonfarm.

About three-fourths of persons responding indicated at least 12 years of public schooling had been completed (Table 24). Of those entering college, 57 percent completed four years or more. In general, the data indicated that the higher the years of formal schooling, the larger the income category of the respondent (Appendix Table 11). The respondents with 15 or more years of formal schooling appeared more likely to be professional, technical or kindred workers (Appendix Table 12).

The nonformal educational experiences of the sample are summarized in Table 25 and Appendix Tables 13 through 28. The low number of observations for any given experience make descriptive analysis difficult although some patterns appeared as discussed below.

Table 23. Income by Occupation of Respondent

Occupation	Income class							
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over	Total	
	number of respondents							per cent
Professional, technical, & kindred workers	11	17	12	6	0	3	49	14.4
Managers & administrators, except farm	10	12	10	8	2	2	44	12.9
Sales, clerical & kindred workers	28	21	9	4	1	0	63	18.5
Craftsmen, foremen & kindred workers	10	15	27	1	1	1	55	16.2
Operatives, including transport	19	23	16	2	0	0	60	17.6
Laborers, except farm	8	6	7	1	1	0	23	6.8
Farmers & farm managers	4	1	1	0	0	0	6	1.8
Farm laborers & farm foremen	2	1	0	0	0	0	3	0.9
Service workers, incl. private household	27	5	3	2	0	0	37	10.9
Total	119	101	85	24	5	6	340	100.0
Percent	35.0	29.7	25.0	7.1	1.5	1.8	100.0	

Totals may not add to 100 percent, due to rounding.
Income is salary, wages, and net farm income where applicable: Does not include spouse's income or income from social security, retirement, investment, and so forth.

Table 24. Formal Schooling of Respondent

Item	Total respondents	Percent
Years of public school completed:		
less than 6	4	1.16
6 to 8	36	10.47
9 to 11	49	14.24
12	255	74.13
Total	344	100.00
Years of college completed:		
1	23	20.91
2	17	15.45
3	7	6.36
4	24	21.82
5	22	20.00
6	7	6.36
7 or more	10	9.09
Total	110	100.00
Years of community college completed:		
1	56	58.95
2	33	34.74
3 or more	6	6.32
Total	95	100.00

Totals may not add to 100 percent due to rounding.

Table 25. Nonformal Education of Respondent

Item	Total respondents	Percent of sample reporting item
Vocational training, specific....	46	13.4
Vocational training, general.....	14	4.1
On-the-job training.....	68	19.8
Military training, specific.....	16	4.6
Military training, general.....	57	16.6
Job apprenticeships.....	59	17.2
Correspondence courses, specific.	34	9.9
Correspondence courses, general..	39	11.3
Other training programs, specific	17	4.9
Other training programs, general.	4	1.2
Workshops & training sessions, specific.....	59	17.2
Workshops & training sessions, general.....	8	2.3
Job experience.....	344	100.0
Respondents in sample.....	344	

Most general educational experiences were concentrated in the lower income categories (except for military training) and were relatively short-term in nature. This result would indicate the inability of lower income groups to translate education into jobs. It could also indicate that expectations of these individuals differ from realizations.

Specific vocational training appeared generally to be less than a year in duration, concentrated in the middle and lower income categories, and more encountered for craftsmen, foremen, and operatives (Appendix Tables 13 and 14).

On-the-job training was generally less than a year in duration and most prevalent for middle and low income respondents (Appendix Table 15). This method of acquiring skills was found most frequently in three occupation groups: sales, clerical, and kindred workers; professional, technical, and kindred workers; and craftsmen, foremen and kindred workers (Appendix Table 16).

As expected, relatively more respondents reported military training as general rather than specific (Appendix Tables 17 and 18). Middle income groups seemed to account for most cases of military training.

Job apprenticeship also appeared mostly short in duration, although several respondents indicated extensive participation (Appendix Tables 19 and 20). More craftsmen and

foremen reported job apprenticeships, and most of these were in excess of a year in duration.

The distribution of correspondence courses in the sample defied (as did some other distributions) visual examination, although appearing to be generally less than a year in length (Appendix Tables 21 and 22).

The number of observations for other training programs was quite limited (Appendix Tables 23 and 24). It was interesting to note, however, that both higher and lower income categories indicated experiences in this category of learning experiences, a category which was principally included to serve a catch-all or miscellaneous purpose.

Workshops and training sessions, as might be expected, were short in nature and usually constituted specific experiences (Appendix Tables 25 and 26). Experienced principally by persons with incomes below $10,000, many apparently were in professional or technical occupations, or in sales and clerical positions.

All respondents had at least 1 year of job experience, by definition. Of those responding, 36 percent had 12 years or less, while nearly 19 percent had more than 36 years in the labor force (Appendix Tables 27 and 28).

V. SUMMARY AND IMPLICATIONS

Summary of Results

Both the interpretation of the model accepted as a basis for final discussion and the descriptive characteristics pointed to similar conclusions. For the regression variables attaining significant t-values, the cross tabulations of characteristics contributed both strength and depth in interpretation. As an example, the sex variable was significant in both equations 1a and 1b. Predicted income of males exceeded that of females. Appendix Tables 2 and 3 indicated a higher portion of females than males in the lower income groups and a higher concentration of females in the sales and clerical occupation category, most likely in the more menial positions. A fifth of the women were also categorized as service workers.

Actually, equation 1a and 1b are interpreted as estimating separate populations, for the regression results revealed a significant difference between the two groups of occupations. In terms of discussing the education variables this became quite important, for although interpretations of several noneducation variables differed between the two equations, it was the educational variables which gave justification to the study.

Persons in occupations comprising equation 1a had a higher incidence of formal education, particularly college

degrees and beyond (Appendix Table 12). As indicated earlier, the public and college schooling variable was highly significant for these occupations (Table 20).

For the white collar occupations these results indicate (for the sample of this study) formal schooling explained a significant amount of labor income. For "labor" occupations public and college schooling was insignificant. Other researchers report apparently different results (23). These apparently conflicting results may be in part ascribed to different populations of interest, varying objectives of the respective studies, and different techniques of analysis. For these reasons, policy makers should exercise caution in interpreting and comparing various income determination studies.

Past research studies discussed in Chapter II had not included informal learning experiences in their analysis, so giving direction to this research. Equations 1a and 1b both indicated that, first, certain types of informal education were significantly and positively related to income. Second, even more relation may exist to be

uncovered, for these two equations and others presented indicated a systematic effect might exist. Equations herein containing pre-determined combinations of education variables were unsuccessful in indicating this systematic effect, but when an F-test was performed, indications were registered that as a set, nonformal education variables contributed to the explanatory power of the equation.

To some degree, then, positive relationships between nonformal learning experiences and labor income were indicated by the results: the significance of certain coefficients and the "systematic effect" apparently present.

For the human capital theorist and practioner, then, acquisition of human capital via informal learning experiences continues important in both theory and in application to income distribution problems. Perhaps exact quantification may never be possible, but for practical applicability such quantification may be less than totally necessary for policy implications to be drawn.

Elimination of women and retired people from the observations appeared to offer little improvement in the

model. This was taken to represent more a statistical problem than a conceptual one. As the objective was to explain labor income, appropriate sampling units were fully-employed workers. Retired persons and women represent general examples of the underemployed, part-time, or causally employed worker. Future investigations would be well advised to consider these points in establishing data collection procedures.

Implications for Further Study

It is difficult to be exhaustive with respect to all the possibilities for further study and research which have been touched upon in this thesis. In an area as undeveloped and new as the theory of human capital and income distribution theory, numerous possibilities have yet to be explored. This represented one of the major problems encountered: to concentrate upon the primary goal and to dismiss or assume away certain alternative goals which continually emerged. The results reported herein only scratch at the surface of a new area of unanswered questions. Both with the data generated through the questionnaire employed for the study, and with new data, many numerous possibilities exist for further research.

One interesting and potentially useful area would be to separate learning experiences by type (e.g., bookkeeping, automobile repair, welding) instead of by the classifications employed in this study (on-the-job training, vocational training, correspondence courses...). One could then estimate equations for various occupations and test hypotheses relative to the significance of various types of learning for a farmer as opposed to a truck driver. These questions could be addressed using data generated in this study.

Also using data generated in this study, a technique such as principal component analysis could be employed and more directly address the questions raised by Jencks as discussed earlier. The informal learning experiences detailed in this study could be collapsed into a relatively few categories by such a technique and new variables developed such as specific informal training, and non-specific informal training.

Passed over by this study, but still very relevant, are relationships between labor income and other variables such as age, race, sex, or labor unions. The possibility of discrimination of several types could be investigated.

Several of the variables included in the model may be measuring, to some extent, the same phenomona. Age and job experience are in some respects similar, for example, and more rigorous consideration could provide useful information.

The occupation categories used in this study were as listed in the 1970 Census of Population. However, these occupation categories may be inappropriate for many studies of human capital theory and income distribution. For example, the combination of accountants, engineers, lawyers, doctors, nurses, preachers, teachers, and radio operators into the category known as professional, technical, and kindred workers might be inappropriate for the study of the effects of education upon labor incomes. Not only are the

educational requirements for entrance into and advancement in these occupations different, but the formal-informal education mix may be quite different. As another example, in the category including sales, clerical, and kindred workers, the inclusion of insurance agents with newsboys, billing clerks, file clerks, and stock and bond salesmen, may introduce a degree of inaccurateness into the regression model.

This study was concentrated in one geographic area, a county which was quite varied in its composition, but nonethe-less one county. What about areas with a different resource base, or a different social composition? What about interaction (mobility or trade) between geographic and trade regions?

Rural and urban populations are similar in some respects, different in others. What economic significance may be attached to these differences and similarities? In some geographic regions economically well-to-do individuals may find it possible and highly desirable to live in rural settings, while in other geographic areas, this may be impossible or socially undesirable to do so. Also, some areas due to their resource base afford a different level of living for rural residents than would other areas with different resource bases.

Further emphasis on the nature of the labor supply and demand functions is needed, both conceptually and

quantitatively. Labor supply particularly is a fruitful area to investigate. A work-leisure model of labor supply to some does not adequately explain some aspects of human capital investments. As theory advances, a much less simplistic model of labor supply will be needed.

Another possibility for expanding the frontiers of knowledge in this area is with respect to the time element. Perhaps the introduction of time (when the education was obtained and when used), might reveal some interesting conclusions. It is also interesting to wonder about the nature of a college degree presently as opposed to the same college degree 20 years ago. In other words, is there a quality difference?

In cases where individuals received many different types of education, both formal and informal, and also moved through a job history which is not necessarily sequential in its characteristics, it may be inappropriate to relate education which was specific to a past occupation as being specific to a current occupation if the two occupations are in essence unrelated. For example, take the case of a barber who attended barber college, became a barber for five years, and then decided to become a welder, took welding courses and became and welder and is currently a welder. Under the classification scheme used in this research, the training for a barber would be specific as long as he

employed this training as a barber. But actually, if he is a welder now, his barber training is general with respect to being a welder.

Further expanding knowledge with respect to income distribution theory and human capital theory, it would be useful to stratify a sample on the basis of several types of learning experiences, insuring adequate representation in the sample of these various experiences. Sampling could present a problem, but the benefits from such a study would be great.

In terms of the time element involved, it might be useful to attempt to re-survey respondents after a number of years. This way changes in education, income levels, and other characteristics are revealed in terms of the same individual.

One also might find some interesting conclusions taking a cue from a recent study by Elsner and Hoch using secondary data (15). By estimating equations for separate income groups - low, middle, high - different effects might be noticeable. The equations estimated herein could possibly differ substantially if estimated for different income groups.

The relationship between occupation and income is indeed a confusing one as is evidenced by studies such as Jencks' which supposedly indicate that beyond determing occupation, education has no effect on incomes. Beyond

clarifying this type of confusion, however, exists further possibilities for research concerning occupations and income level, particularly with respect to occupational mobility. Occupational mobility may present an effective method for augmenting income level (12). Occupational mobility may be thought of as either immediately increasing income levels or increasing the income potential for future time periods. In practice, these two possibilities may often occur in varying combinations. Actually, it might be possible in some cases to interpret occupational mobility as either the acquisition of new learning experiences or the more effective utilization of prior education. In any case, occupational mobility should be considered important in low-income programs as complementary to and perhaps even a synonym for educational programs.

Questions regarding the appropriate dependent variable in regressions such as the ones estimated herein may be appropriate matters for concern. Attempting to relate educational levels, for example, to labor income for lawyers or corporation executives may be inappropriate to the extent that they attempt to maximize total income, including investments and other non-labor income. To the extent various occupations entail psychic income would also influence the dependent variable used. Most agricultural economists should be aware of the difficulty of estimating labor income of the farm owner-operator who has substantial investment

in his farm and whose net farm income may be allocated to returns to capital invested, returns to managerial abilities, and returns to his labor. Estimating returns to labor as the residual after the first two items are deducted in many cases indicate a negative labor income.

The problem of under-employment is also worthy of consideration. In the previous chapter an attempt was made to drop women and retired persons from the regression principally because they were currently under-employed with respect to earning labor income. This question should be addressed first in the determination of objectives for a new study and second, in the sampling procedure, particularly with respect to instructing interviewers to obtain personal interview data.

Measurement of the education variables may be crucial. Education variables vary in quality per time unit acquired. Perhaps analysis based on a yes-no response would avoid some measurement problems and reveal further insights.

The socio-economic atmosphere in which an individual exists and in which he was raised is important. While perhaps not subject to rigorous analysis by economists, the influence of family background upon income levels may be significant. This might represent potential solutions to long-run economic problems by concentrating on children of low-income families, but offers little immediate relief for the current low income problem. Investment in human capital begins, most generally, at the time an individual is born.

Policy Implications

The most general policy implication is at the same time the most specific that can be drawn from this study. Education matters, but to uncover which types of education matter the most is dependent upon circumstances. This research effort was not designed to show that individual types of learning experiences would increase income, else the sample would have been stratified along education types to ensure adequate representation. But to say that education matters implies, first, that there may be monetary as well as aesthetic justification for acquiring formal schooling.

Further justification in this study for public or private policies to address income problems is lacking to a large degree. As indicated by the length and content of the preceeding section on further research, many questions remain unanswered. The inability to ascribe significance to a given learning experience does not necessarily mean the experience is meaningless with respect to influence on income levels. An insigificant coefficient in the equation for the labor occupations for public and college schooling, for example, does not provide justification for cutting back on school support. As implied earlier, the relationship between education, occupation, and income is complex and perhaps often misinterpreted.

In the final evaluation, this study may lend some support to the contention that education, formal and informal,

may be a relevant factor in explaining income levels. The exact and specific nature of this relationship was not established herein. As indicated by the extensive discussion of needed research, the appropriate policy implications of this and other income determination studies require further study.

Despite the inability to derive significant and specific policy recommendations from the results reported, the complexity of the situation has been illustrated and perhaps lessened somewhat by findings regarding relationships investigated.

In conclusion, the policy maker interested in questions related to income levels may overlook an important factor if various forms of learning experiences are not considered. Though research has yet to specify the exact nature of the relationship, there does appear to be a significant relationship between education in its various forms and income.

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APPENDICES

APPENDIX I

DESCRIPTIVE TABLES

Table 1. Income by Age of Respondents

Age	Income class							
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over	Total	
	number of respondents							per cent
under 25	12	14	1	1	0	0	28	8.2
25-34	19	30	25	2	0	0	76	22.4
35-44	11	17	19	8	0	0	55	16.2
45-54	14	23	24	6	3	3	73	21.5
55-64	22	16	15	7	2	3	65	19.1
65 and over	41	1	1	0	0	0	43	12.6
Total	119	101	85	24	5	6	340	100.0
Percent	35.0	29.7	25.0	7.1	1.5	1.8	100.0	

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable: Does not include spouse's income or income from social security, retirement, investment, and so forth.

Table 2. Sex by Income of Respondent

Income class	Sex			
	Male		Female	
	number of respondents	percent	number of respondents	percent
Under $5,000.....	47	19.8	72	69.9
$5,000-$9,999....	79	33.3	22	21.4
$10,000-$14,000..	77	32.5	8	7.8
$15,000-$19,999..	23	9.7	1	1.0
$20,000-$24,999..	5	2.1	0	0
$25,000 and over.	6	2.5	0	0
Total.....	237	100.0	103	100.0

Totals may not add to 100 percent due to rounding

Income is salary, wages and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment and so forth.

Table 3. Sex by Occupation of Respondent

Occupation	Sex	
	Male	Female
Professional, technical & kindred workers	32	18
Managers & administrators, except farm	33	11
Sales, clerical, & kindred workers	25	38
Craftsmen, foremen, & kindred workers	55	2
Operatives, including transport	50	11
Laborers, except farm	22	1
Farmers & farm managers	6	0
Farm laborers & farm foremen	2	1
Service workers, incl. private household	11	20
Total	236	102

Table 4. Selected Characteristics by Race of Respondent.

Item	Race	
	Caucasian	Noncaucasian
	---number of respondents---	
Occupation:		
Professional, technical & kindred workers	49	1
Managers & administrators, except farm	44	0
Sales, clerical & kindred workers	62	1
Craftsmen, foremen, & kindred workers	57	0
Operatives, including transport	61	0
Laborers, except farm	23	0
Farmers & farm managers	6	0
Farm laborers & farm foremen	3	0
Service workers, incl. private household	29	2
Total	334	
Retired:		
Retired	55	0
Not retired	285	4
Residence:		
Rural	114	1
Urban	226	3
Income:[1]		
Under $5,000	116	3
$5,000-$9,999	101	0
$10,000-$14,999	85	0
$15,000-$19,999	23	1
$20,000-$24,999	5	0
$25,000 and over	6	0
Total	336	4
Percent	98.8	1.2

[1] Income is salary, wages, and net farm income where applicable: Does not include spouse's income or income from social security, retirement, investment, and so forth.

Table 5. Disability by Occupation of Respondent.

Occupation	Disability	No Disability
	--number of respondents--	
Professional, technical & kindred workers	4	46
Managers & administrators, except farm	6	38
Sales, clerical, & kindred workers	10	53
Craftsmen, foremen & kindred workers	10	47
Operatives, including transport	11	50
Laborers, except farm	5	18
Farmers & farm managers	1	5
Farm laborers & farm foremen	0	3
Service workers, including private household	5	26
Total	52	286

Table 6. Retired by Occupation and Residence of Respondent.

Item	Not retired	Retired
	--number of respondents--	
Occupation:		
Professional, technical & kindred workers	45	5
Managers & administrators, except farm	36	8
Sales, clerical, & kindred workers	54	9
Craftsmen, foremen & kindred workers	51	6
Operatives, including transport	56	5
Laborers, except farm	17	6
Farmers & farm managers	4	2
Farm laborers & farm foremen	1	2
Service workers, incl. private household	21	10
Total	285	35
Residence:		
Urban	197	32
Rural	92	23
Total	289	55

Table 7. Residence by Occupation of Respondent.

Occupation	Residence	
	Rural	Urban
	--number of respondents--	
Professional, technical, & kindred workers	13	37
Managers & administrators, except farm	11	33
Sales, clerical & kindred workers	13	50
Craftsmen, foremen, & kindred workers	20	37
Operatives, including transport	26	35
Laborers, except farm	8	15
Farmers & farm managers	6	0
Farm laborers & farm foremen	2	1
Service workers, incl. private household	14	17
Total	113	225

Table 8. Income by Residence of Respondents

Income class	Urban		Rural		Total	
	Total respondents	Percent	Total respondents	Percent	Total respondents	Percent
under $1,000.....	36	15.8	25	22.1	61	17.9
$1,000-$1,999.....	8	3.5	4	3.5	12	3.5
$2,000-$2,999.....	7	3.1	8	7.1	15	4.4
$3,000-$3,999.....	7	3.1	7	6.2	14	4.1
$4,000-$4,999.....	12	5.3	5	4.4	17	5.0
$5,000-$5,999.....	11	4.8	2	1.8	13	3.8
$6,000-$6,999.....	12	5.3	5	4.4	17	5.0
$7,000-$7,999.....	15	6.6	7	6.2	22	6.4
$8,000-$8,999.....	20	8.8	3	2.6	23	6.7
$9,000-$9,999.....	17	7.5	9	8.0	26	7.6
$10,000-$14,999...	53	23.2	32	28.3	85	24.9
$15,000-$19,999...	20	8.8	5	4.4	25	7.3
$20,000-$24,999...	4	1.8	1	0.9	5	1.5
$25,000-and over..	6	2.6	0	0	6	1.8
Total	228	100.0	113	100.0	341	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable: Does not include spouse's income or income from social security, retirement, investment and so forth.

Table 9. Income of Respondent

Income class	Total Respondents	Percent
Salary and wages		
under $1,000	67	19.70
$1,000-$1,999	9	2.65
$2,000-$2,999	15	4.41
$3,000-$3,999	13	3.82
$4,000-$4,999	16	4.71
$5,000-$5,999	14	4.12
$6,000-$6,999	15	4.41
$7,000-$7,999	22	6.47
$8,000-$8,999	25	7.35
$9,000-$9,999	27	7.94
$10,000-$14,999	84	24.71
$15,000-$19,999	22	6.47
$20,000-$24,999	5	1.47
$25,000 and over	6	1.76
Total	340	100.00
Net farm income		
$1-$1,000	10	62.50
$1,000-$2,999	1	6.25
$3,000-$3,999	2	12.50
$4,000-$4,999	2	12.50
$5,000-$5,999	0	0
$6,000-$6,999	1	6.25
$7,000 and over	0	0
Total	16	100.00

Totals may not add to 100 percent due to rounding.

Figures above do not include spouse's income, or income from social security, retirement, investment, and so forth.

Table 10. Industry by Occupation for Respondent.

Item	Occupation									Total	Percent
	Profession, technical & kindred	Managers & administrators	Sales, clerical & kindred workers	Craftsmen, foremen & kindred workers	Operatives, incl. transport	Laborers	Farmers & farm managers	Farm laborers & farm foremen	Service workers, incl. private household		
	---number of respondents----------										
Industry:											
Agriculture, forestry & fisheries....	0	0	1	0	0	2	6	3	0	12	3.56
Mining.....	0	0	0	0	1	0	0	0	0	1	0.30
Construction..	0	4	2	18	3	2	0	0	1	30	8.90
Manufacturing	5	4	1	19	36	16	0	0	2	83	24.63
Transportation & other public util..	1	7	6	7	7	1	0	0	0	29	8.61
Wholesale & retail trade.....	2	11	23	5	7	0	0	0	5	53	15.73
Finance, insurance & real estate..	0	3	10	0	0	0	0	0	0	13	3.86
Business & repair service.....	1	1	2	7	4	1	0	0	2	18	5.34
Personal service.....	0	2	1	0	2	0	0	0	3	8	2.37
Entertainment & Recreation services.....	0	1	0	0	0	0	0	0	0	1	0.30
Professional & related services.....	34	6	9	0	0	0	0	0	15	64	18.99
Public administration.	7	5	8	1	0	1	0	0	3	25	7.42
Total.....	50	44	63	57	60	23	6	3	31	337	100.00

Totals may not add to 100 percent due to rounding.

Table 11. Formal Education by Income of Respondent

Income class	Years of formal education					Total	
	under 9	9 to 11	12 to 14	15 to 17	18 and over		
	number of respondents						per cent
under $5,000	25	16	57	18	3	119	35.0
$5,000-$9,999	7	15	58	15	6	101	29.7
$10,000-$14,999	6	13	46	12	8	85	25.0
$15,000-$19,999	0	0	11	7	6	24	7.1
$20,000-$24,999	0	1	2	1	1	5	1.5
$25,000 and over	0	0	3	1	2	6	1.8
Total	38	45	177	54	26	340	100.0
Percent	11.2	13.2	52.1	15.9	7.6	100.0	

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable: Does not include spouse's income or income from social security, retirement, investment, and so forth.

Formal education includes only secondary schools, college, university, community college, and business school.

Table 12. Formal Education by Occupation of Respondent

Occupation	Years of formal education						
	under 9	9 to 11	12 to 14	15 to 17	18 & over	Total	Average
	number of respondents						years
Professional, technical, & kindred workers.....	0	3	7	22	18	50	16.5
Managers & administrators, except farm.....	3	6	22	8	5	44	13.2
Sales, clerical & kindred workers.....	1	3	45	12	2	63	13.5
Craftsmen, foremen & kindred workers.....	7	11	36	4	1	59	11.8
Operatives, including transport.....	6	13	38	4	0	61	11.7
Laborers, except farm...	8	5	10	0	0	23	10.3
Farmers, & farm managers	2	1	3	0	0	6	10.3
Farm laborers & farm foremen.....	2	1	0	0	0	3	8.7
Service workers, incl. private household.....	7	3	17	4	0	31	11.5
Total.....	36	46	178	54	26	340	12.8

Formal education includes secondary schools, college, university, community college, and business school.

Table 13. Vocational Training by Income of Respondent.

Item	Income class						Total	
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondents							per cent
Specific:								
1 to 12 months.....	12	13	9	5	0	1	40	87.0
13 to 24 months.....	0	2	0	0	0	1	3	6.5
25 to 36 months.....	1	1	1	0	0	0	3	6.5
more than 36 months....	0	0	0	0	0	0	0	0
Total.....	13	16	10	5	0	2	46	100.0
General:								
1 to 12 months.....	9	3	0	0	0	0	12	85.7
13 to 24 months.....	1	1	0	0	0	0	2	14.3
more than 36 months....	0	0	0	0	0	0	0	0
Total.....	10	4	0	0	0	0	14	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment and so forth.

Table 14. Vocational Training by Occupation of Respondent.

Occupation	Specific		General	
	1 to 11 months	12 months and over	1 to 11 months	12 months and over
	number of respondents			
Professional, technical, & kindred workers	2	2	3	0
Managers & administrators, except farm	4	3	2	0
Sales, clerical & kindred workers	6	1	3	1
Craftsmen, foremen, & kindred workers	10	1	1	0
Operatives, including transport	7	1	2	1
Laborers, except farm	0	1	0	0
Farmers & farm managers	1	0	0	0
Farm laborers & farm foremen	0	0	0	0
Service workers, incl. private household	4	1	2	0
Total	34	10	13	2

Table 15. On-the-Job Training by Income of Respondent

Item	Income class						Total	
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondents							per cent
1 to 12 months	21	20	18	5	0	0	64	94.1
13 to 24 months	0	0	1	0	0	0	1	1.5
25 to 36 months	0	1	0	0	0	0	1	1.5
more than 36 months	0	0	1	0	0	1	2	2.9
Total	21	21	20	5	0	1	68	100.0

Totals may nod add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment and so forth.

Table 16. On-the-Job Training by Occupation of Respondent.

Occupation	12 months	Over 12 months
	---number of respondents---	
Professional, technical, & kindred workers.....	11	2
Managers & administrators, except farm.....	7	2
Sales, clerical & kindred workers.....	18	1
Craftsmen, foremen, & kindred workers.....	10	2
Operatives, including transport.....	5	3
Laborers, except farm.....	2	0
Farmers & farm managers.....	0	0
Farm laborers & farm foremen.....	0	0
Service workers, incl. private household.....	6	1
Total.....	59	11

Table 17. Military Training by Income of Respondent.

Item	Income class						Total	
	Under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondents							per cent
Specific:								
1 to 12 months	0	7	4	2	0	1	14	87.5
13 to 24 months	1	0	0	1	0	0	2	12.5
More than 24 months	0	0	0	0	0	0	0	0
Total	1	7	4	3	0	1	16	100.0
General:								
1 to 12 months	4	16	26	5	1	3	55	96.5
13 to 24 months	0	1	0	1	0	0	2	3.5
More than 24 months	0	0	0	0	0	0	0	0
Total	4	17	26	6	1	3	57	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment, and so forth.

Table 18. Military Training by Occupation of Respondent.

Occupation	Specific		General	
	1 to 11 months	12 months and over	1 to 11 months	12 months and over
	number of respondents			
Professional, technical, & kindred workers.....	2	3	10	1
Managers & administrators, except farm.....	3	0	7	3
Sales, clerical & kindred workers..	2	0	7	2
Craftsmen, foremen, & kindred workers.....	1	0	11	2
Operatives, including transport	4	0	7	1
Laborers, except farm.....	0	0	5	0
Farmers & farm managers.....	0	0	0	0
Farm laborers & farm foremen.....	0	0	1	0
Service workers, incl. private household.....	1	0	0	0
Total.....	13	3	48	9

Table 19. Job Apprenticeship by Income of Respondent

Item	Income class						Total	
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondents							per cent
1 to 12 months	8	12	7	0	0	0	27	45.8
13 to 24 months	2	5	2	1	0	0	10	17.0
25 to 36 months	0	2	2	0	0	0	4	6.8
More than 36 months	2	4	9	1	2	0	18	30.5
Total	12	23	20	2	2	0	59	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment and so forth.

Table 20. Job Apprenticeship by Occupation of Respondent.

Occupation	1 to 11 months	12 months and over
	-------number of respondents-------	
Professional, technical, & kindred workers.....	0	8
Managers & administrators, except farm....	0	4
Sales, clerical & kindred workers.....	2	3
Craftsmen, foremen, & kindred workers.....	6	17
Operatives, including transport.....	4	6
Laborers, except farm.	1	3
Farmers & farm managers.....	0	0
Farm laborers & farm foremen.....	1	0
Service workers, incl. private household....	2	1
Total.....	16	42

Table 21. Correspondence Courses by Income of Respondent.

Item	Income class						Total	
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondents							per cent
Specific:								
1 to 12 months	5	11	8	2	1	0	27	79.4
13 to 24 months	1	1	1	0	0	0	3	8.8
25 to 36 months	1	0	1	0	0	0	2	5.9
more than 36 months	1	0	1	0	0	0	2	5.9
Total	8	12	11	2	1	0	34	100.0
General:								
1 to 12 months	10	9	7	2	0	2	30	76.9
13 to 24 months	3	2	0	2	0	1	8	20.5
25 to 36 months	0	0	0	0	0	0	0	0
more than 36 months	1	0	0	0	0	0	1	2.6
Total	14	11	7	4	0	3	39	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income, or income from social security, retirement, investment, and so forth.

Table 22. Correspondence Courses by Occupation of Respondent.

Occupation	Specific		General	
	1 to 11 months	12 months and over	1 to 11 months	12 months and over
	number of respondents			
Professional, technical, & kindred workers	9	2	3	3
Managers & administrators, except farm	4	3	6	4
Sales, clerical, & kindred workers	7	3	8	3
Craftsmen, foremen, & kindred workers	1	3	2	0
Operatives, including transport	0	1	2	2
Laborers, except farm	1	0	1	2
Farmers & farm managers	0	0	0	0
Farm laborers & farm foremen	0	0	0	0
Service workers, incl. private household	0	0	2	1
Total	22	12	24	15

Table 23. Other Training Programs by Income of Respondent.

Item	Income class						Total	
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondent							per cent
Specific:								
1 to 12 months	6	3	1	5	1	1	17	100.0
more than 13 months	0	0	0	0	0	0	0	0
Total	6	3	1	5	1	1	17	100.0
General:								
1 to 12 months	2	0	0	2	0	0	4	100.0
more than 13 months	0	0	0	0	0	0	0	0
Total	2	0	0	2	0	0	4	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment and so forth.

Table 24. Other Training Programs by Occupation of Respondent.

Occupation	Specific		General	
	1 to 11 months	12 months and over	1 to 11 months	12 months and over
	number of respondents			
Professional, technical & kindred workers	2	1	0	0
Managers & administrators, except farm	4	0	0	1
Sales, clerical, & kindred workers	5	0	1	1
Craftsmen, foremen, & kindred workers	1	0	0	0
Operatives, including transport	2	0	0	0
Laborers, except farm	0	0	0	0
Farmers & farm managers	0	0	0	0
Farm laborers & farm foremen	0	0	0	0
Service workers, incl. private household	3	0	1	0
Total	17	1	2	2

Table 25. Workshops and Training Sessions by Income of Respondent.

Item	Income class						Total	
	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over		
	number of respondents							per cent
Specific:								
1 to 12 months.....	14	20	6	6	1	4	51	86.4
13 to 24 months.....	1	1	2	3	0	0	7	11.9
more than 25 months.....	0	0	0	0	1	0	1	1.7
Total.....	15	21	8	9	2	4	59	100.0
General:								
1 to 12 months.....	4	1	2	0	0	0	7	87.5
more than 12 months.....	1	0	0	0	0	0	1	12.5
Total.....	5	1	2	0	0	0	8	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages, and net farm income where applicable; does not include spouse's income or insomce from social security, retirement, investment and so forth.

Table 26. Workshops and Training Sessions by Occupation of Respondent.

Occupation	Specific		General	
	1 to 11 months	12 months and over	1 to 11 months	12 months and over
	number of respondents			
Professiona, technical, & kindred workers.....	21	3	2	0
Managers & administrators, except farm.....	9	5	0	0
Sales, clerical & kindred workers...	11	0	1	0
Craftsmen, foremen & kindred workers.	4	0	2	1
Operatives, including transport.	4	0	0	0
Laborers, except farm.....	0	0	1	0
Farmers & farm managers.....	0	0	1	0
Farm laborers & farm foremen.....	0	0	0	0
Service workers, incl. private household.....	2	0	0	0
Total.....	51	8	7	1

Table 27. Job Experience by Income of Respondent.

Job experience	under $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 and over	Total	
	number of respondents							per cent
1 to 12 years	51	43	24	5	0	0	123	36.4
13 to 24 years	16	23	26	6	1	2	74	21.9
25 to 36 years	19	24	23	7	2	3	78	23.1
more than 36 years	32	11	12	5	2	1	63	18.6
Total	118	101	85	23	5	6	338	100.0

Totals may not add to 100 percent due to rounding.

Income is salary, wages and net farm income where applicable; does not include spouse's income or income from social security, retirement, investment and so forth.

Table 28. Job Experience by Occupation of Respondent

Occupation	Job experience		
	under 12 years	12 to 24 years	25 years and over
	---number of respondents----		
Professional, technical, & kindred workers.....	23	12	16
Managers & administrators, except farm.....	9	10	25
Sales, clerical & kindred workers.....	31	18	14
Craftsmen, foremen, & kindred workers.....	14	11	32
Operatives, including transport.....	27	18	16
Laborers, except farm.....	6	1	16
Farmers & farm managers.....	0	0	6
Farm laborers & farm foremen.	0	0	3
Service workers, incl. private household.....	14	4	13
Total.....	124	74	141

APPENDIX II

QUESTIONNAIRE FACSIMILE

BH-23/72 OREGON STATE UNIVERSITY 9/4/73

1 - 1 Husband
2 Wife
3 Son/Daughter
4 Other (Who? _____)

First, may I ask how many full time breadwinners there are in your family? (Who is this breakwinner?) (Who are these breadwinners?)

(INT: If more than one, interview either breadwinner. If not home, discontinue and make arrangements to call back.)

2 - First of all, what would you say are two or three of the most important problems facing you and your family today?

3 - 1 Less than 1 year
2 1-4.9 years
3 5-9.9 years
4 10-14.9 years
5 15 years or more

About how long have you lived in this particular area or community?

4 - _____ grade
12 D.K.

Thinking of grade shool through high school only, which was the last of these grades you completed?

4a- _____ year
12 D.K.

What year was this (that you completed the last grade)?

5 - 1 Regular college or University (continue)
2 Business College (skip to #6a)
3 Community Col. (skip to 6a)
4 Other (What?_____) (Skip to 6)
5 No college (Skip to #6)

Did you happen to attend college? (If YES) What type of college was this?

5a- _____ year
12 D.K.

What was the last year you attended college?

5b _____ highest degree
12 No degree

Did you happen to get a college degree? (If YES) What degree was this -- bachelor's, master's or what?

5c- _____ years 12 D.K.	Approximately how many full years did you attend college?
5d- _____ (Major)	What was your major or principal area of study in college?
6 - 1 Yes (Continue) 2 No (Skip to #7)	Did you happen to attend community college or business school?
6a- _____ year 12 D.K.	What was the last year you attended (community college) (business school)?
6b- 1 Yes 2 No or D.K.	Did you happen to get a degree from (community college) (business school)?
6c- _____ years 12 D.K.	Approximately how many years did you attend (community college) (business school)?
6d- _____ (Major)	What were your major areas of study in (community college) (business school)?
ASK OF EVERYONE 7 - 1 Yes (Continue) 2 No (Skip to #8)	Not counting public school and college, have you taken any vocational training courses where you were trained to do some specific type of work?
7a- (#1) _____ yrs. 12 D.K. (#2) _____ yrs. 12 D.K. (#3) _____ yrs. 12 D.K.	When was this vocational training taken -- the approximate year or years? (INT: If more than one training taken, list each one in chronological order and maintain this order in 7c and 7d. This listing procedure also applies in questions 8-13)
7b- 1 Yes 2 No	Did you complete the vocational training course(s)?
7c- (#1) _____ wks. 12 D.K. (#2) _____ wks. 12 D.K. (#3) _____ wks. 12 D.K.	Approximately how many weeks did you take vocational training?
7d- (#1) _____ (#2) _____ (#3) _____	What type of vocational training have you taken -- along what lines?

ASK OF EVERYONE

8 - During the time you have been employed, has your employer offered you any specific on-the-job training? (If YES) Did you take this on-the-job training?

1 Offered - taken (Ask 8a)
2 Offered - not taken (Skip to #9)
3 None offered or taken (Skip to #9)

8a- (#1) _____ yrs.
12 D.K.
(#2) _____ yrs.
12 D.K.
(#3) _____ yrs.
12 D.K.

When was this on-the-job training taken?

8b- (#1) _____ wks.
12 D.K.
(#2) _____ wks.
12 D.K.
(#3) _____ wks.
12 D.K.

Approximately how many weeks did this on-the-job training cover?

8c- (#1) _____
(#2) _____
(#3) _____

What type of job training was this -- in what type of work?

ASK OF EVERYONE

9 - 1 Yes (Continue)
2 No (Skip to #10)

Turning to the military, have you ever served in the U.S. military?

9a- (#1) _____ yrs.
12 D.K.
(#2) _____ yrs.
12 D.K.
0 None (Skip to #10)

Did you take any special job training in the military?

(If YES) When did this job training take place? (If NO job training, skip to #10)

9b- (#1) _____ wks.
12 D.K.
(#2) _____ wks.
12 D.K.
(#3) _____ wks.
12 D.K.

About how long did this military job training last?

9c- _____ (Type)

What was the main type of job training you received in the military -- the type of work you did in the military?

ASK OF EVERYONE

10 - 1 Yes (Continue)
2 No (Skip to #11)

Have you ever served a job apprenticeship?

10a- (#1) _____ yr.
12 D.K.
(#2) _____ yr.
12 D.K.
(#3) _____ yr.
12 D.K.

When did this apprenticeship take place?

10b- (#1) _____ mos.
12 D.K.
(#2) _____ mos.
12 D.K.
(#3) _____ mos.
12 D.K.

Approximately how long did this apprenticeship last?

10c- (#1) _____
(#2) _____
(#3) _____

What type of apprenticeship was this -- in what type of work?

ASK OF EVERYONE

11 - 1 Yes (Continue)
2 No (Skip to #12)

Have you taken any extension, correspondence or self-improvement courses where educational materials are sent to you at home or where you attended courses?

11a- (#1) _____ yr.
12 D.K.
(#2) _____ yr.
12 D.K.
(#3) _____ yr.
12 D.K.

When did you take (this course (these courses)?

11b- (#1) _____ wks.
12 D.K.
(#2) _____ wks.
12 D.K.
(#3) _____ wks.
12 D.K.

Approximately how many weeks did (this course) (these courses) last?

11c- (#1) _____
(#2) _____
(#3) _____

What type, or types, of courses where these -- in what lines of work?

ASK OF EVERYONE

12 - 1 Yes (Continue)
2 No (Skip to #13)

What about other job training programs -- have you ever had other training courses for any line of work?

12a- (#1) _____ yr.
12 D.K.
(#2) _____ yr.
12 D.K.
(#3) _____ yr.
12 D.K.

When were you enrolled in this job training program?

12b- (#1) _____ wks.
12 D.K.
(#2) _____ wks.
12 D.K.
(#3) _____ wks.
12 D.K.

Approximately how many weeks did this job training program last?

12c- (#1) _____
(#2) _____
(#3) _____

What type of program was this -- in what line of work or in what field of endeavor?

ASK OF EVERYONE

13 - 1 Yes (continue)
2 No (Skip to #14)

During the time you have been employed have you taken any special workshops or training sessions?

13a- (#1) _____ yr.
12 D.K.
(#2) _____ yr.
12 D.K.
(#3) _____ yr.
12 D.K.

When were these workshops or sessions held?

13b- (#1) _____ wks.
12 D.K.
(#2) _____ wks.
12 D.K.
(#3) _____ wks.
12 D.K.

Approximately how many weeks did these workshops or sessions last?

13c- (#1) _____
(#2) _____
(#3) _____

What type of workshops or sessions were these -- in what type, or types, of work?

ASK OF EVERYONE

14 - 1 Yes (Continue)
2 No (Skip to #15)

Thinking back to when you were growing up and living in your family's household, did you learn any specific business or vocational skills that helped you when you went to work?

14a- _____
_____
_____
(type or types)

What type of skills or training was this?

ASK OF EVERYONE

15 - Job #1 _____ type
_____ Industry

Now, let's go back to the first job you held as an adult wage earner. (Do not include parttime work as a student.) What was your first job -- what type of work did you do and in what type industry?

15a- _____ year When did you start your first job -- what year?

_____ (How long?) How long were you employed at your first job?

15b- Taking it from the first job, what other jobs, if any, have you held since then, including your present job? (Include type and industry) (If "NONE", write in)

Type of work & industry?	Year started?	How long lasted?
Job #2 _____ type _____ industry		_____ yrs. or _____ mos. full-time_Part-time_
Job #3 _____ type _____ industry		_____ full___ pt-time___
Job #4 _____ type _____ industry		_____ full___ pt-time___
Job #5 _____ type _____ industry		_____ full___ pt-time___
Job #6 _____ type _____ industry		_____ full___ pt-time___
Job #7 _____ type _____ industry		_____ full___ pt-time___
Job #8 _____ type _____ industry		_____ full___ pt-time___
Job #9 _____ type _____ industry		_____ full___ pt-time___
Job #10 _____ type _____ industry		_____ full___ pt-time___
Job #11 _____ type _____ industry		_____ full___ pt-time___

15c-	_____ (months/days)	Approximately how long did you work in 1972? (If NONE, explain why)
15d-	1 (a) 1 (h) 2 (b) 2 (i) 3 (c) 3 (j) (If 4 (d) 4 (k) "NONE,") 5 (e) 5 (l) (write 6 (f) 6 (m) in) 7 (g) 7 (n)	On this card (HAND CARD A) are some broad income brackets. Will you please glance at them and tell me which one best represents the income you, yourself, received from work performed in 1972? (Do not include income from farming) Just call your answer by letter, please. (INT: Circle code # corresponding to answer)
16 -	1 Yes - all the time) Ask 2 Yes - part of time) 16a 3 No (Skip to #17)	Were you self-employed in any work you did in 1972?
16a-	1 (a) 5 (e) 2 (b) 6 (f) 3 (c) 7 (g) 4 (d) 8 (h)	(HAND CARD B) How much do you have invested in your machinery, equipment, land and buildings which are used in your work? Just call your answer by letter, please? (INT: Circle code number corresponding to answer)
17 -	ASK OF EVERYONE 1 Yes What? _____ _____ _____ _____ 2 No	During the past month, have you read any books, magazines or trade newspapers related to your present job? (If YES) Which one(s)?
18 -	1 Yes 2 No	Do you now belong to a labor union associated with your work?
19 -	1 Yes (continue) 2 No (Skip to #20)	In 1972, did you happen to have any kind of disability or health problem which prevented you from working full-time or prevented you from doing certain kinds of work?
19a-	_____ type	May I ask the general nature of this disability or health problem?

19b- _____ months/years 12 D.K.	About how long have you had this disability or health problem?
19c- 1 Yes (When? _____) 2 No	Has this disability or health problem ever caused you to change jobs or employers? (If YES) When was this -- what year, or years?
ASK OF EVERYONE	
20 - 1 Yes (continue) 2 No (Skip to #20c) 3 (Not married/widowed divorced) (Skip to #21)	Was your (wife) (husband) employed at any time during the year 1972?
20a- _____ type _____ industry	What type of work did (he) (she) do?
20b- 1 (a) 1 (h) 2 (b) 2 (i) 3 (c) 3 (j) 4 (d) 4 (k) 5 (e) 5 (l) 6 (f) 6 (m) 7 (g) 7 (n)	(HAND CARD A) Using the income card again, which of these comes closest to the total amount your spouse earned from work done in 1972? (Just approximately?)
ASK OF EVERYONE	
20c- 1 College graduate 2 College - partial 3 High school - complete 4 High school - partial 5 Grade or no schooling	Speaking of your (husband) (wife), would you please tell me the last grade (she) (he) completed in school?
21 - 1 Investments 2 Welfare 3 Unemployment compensation 4 Social security 5 Property rental 6 Interest 7 Retirement 11 Other (What? _____) 12 No other income (Skip to #22)	Not counting income from work performed by you and your (wife) (husband), did your household receive income from any other sources in 1972, such as investments, interest, rental, welfare, unemployment compensation, social security, retirement or other types of government payments, and so on? (If YES) What was the source of this income? (Do not include income from farming.)

21a-	1 (a) 2 (b) 3 (c) 4 (d) 5 (e) 6 (f) 7 (g)	1 (h) 2 (i) 3 (j) 4 (k) 5 (l) 6 (m) 7 (n)	Now, what is your best estimate of the amount of this other income you received in 1972? (HAND CARD A) Just your best estimate? (INT: Circle code corresponding to answer)

ASK OF EVERYONE

22 -	1 Yes (Continue) 2 No (Skip to #23)	Did you do any farming in 1972 from which you received income?

22a-	1 (a) 2 (b) 3 (c) 4 (d)	5 (e) 6 (f) 7 (g) 8 (h)	(HAND CARD B) What was the approximate amount of your gross sales of farm produce in 1972? Call your answer by letter please?

22b-	1 (a) 2 (b) 3 (c) 4 (d) 5 (e) 6 (f) 7 (g)	1 (h) 2 (i) 3 (j) 4 (k) 5 (l) 6 (m) 7 (n)	(HAND CARD A) After you paid all the expenses of raising this produce in 1972, about what would your net income be? Just call your answer by letter please?

22c-	1 (a) 2 (b) 3 (c) 4 (d)	5 (e) 6 (f) 7 (g) 8 (h)	(HAND CARD B) Approximately how much do you have invested in your farm -- land, buildings, machinery, and equipment?

23 -	_____ (family)	Including yourself, how many persons are there in your family living at home?
	_____ (Under 18)	How many are under 18 years of age?

24 -	_____ age	What is your approximate age?

25 -	1 Male 2 Female	1 Caucasian 2 Black 3 Oriental 4 Other (What?____)	1 Eugene City 2 Eugene Suburb 3 Small community 4 Open countryside, not a farm 5 Farm

26 -	_____ miles to Eugene City Center

27 - 1 Rural route _____ (Identify & give tract number)

2 Urban area _____ (List tract & block number where interview taken)

X I hereby certify this interview was actually taken with the person described above and represents a true and accurate account of the contact.

_____ _____
(Address) (City or Town)

_____
(Telephone No.)

_____
(Interviewer's Signature

COMMENTS:

Verified in person_____

by phone _____

Date of verification:_____

FACSMILIES OF INCOME CARDS
FOR QUESTIONS 15d, 16a, 20b, 21, 22

CARD A

Which one of these best represents the income you, yourself, received from work performed in 1972. This is total income before taxes or other deductions.

(a) Under $1,000
(b) $1,000 - $1,999
(c) $2,000 - $2,999
(d) $3,000 - $3,999
(e) $4,000 - $4,999
(f) $5,000 - $5,999
(g) $6,000 - $6,999
(h) $7,000 - $7,999
(i) $8,000 - $8,999
(j) $9,000 - $9,999
(k) $10,000 - $14,999
(l) $15,000 - $19,999
(m) $20,000 - $24,999
(n) $25,000 or over

JUST CALL YOUR ANSWER BY LETTER, PLEASE.

CARD B

(a) Less than $5,000
(b) $5,000 - $9,999
(c) $10,000 - $19,999
(d) $20,000 - $29,999
(e) $30,000 - $49,999
(f) $50,000 - $74,999
(g) $75,000 - $99,999
(h) $100,000 or over

APPENDIX III

DATA GATHERING

Sample Size and Allocation

Sample size was determined by using grouped data (number of families by income class) from the Census for Lane County (54, p. 22). The number of families by income class for urban, rural, and total formed the basis for calculation in Table 2 of the standard deviation (42, p. 79).

Using the standard deviations calculated by this method, the sample size was calculated for urban, rural, and total. The formula used was (21, p. 128)

$$n_i = \frac{K^2 V_i^2}{D^2}$$

where n_i = sample size

K = 2 = Probability that the sample result will have a relative error no greater than ±D [approximately 98 percent confidence level].

D = .08 = Selected level of accuracy required [maximum error allowed] for observed differences ±8 percent.

$V_i^2 = (\frac{s_i}{\bar{X}_i})^2$ = Coefficient of variation.

Thus,

$$n_1 = \frac{2^2 (\frac{7,638.44}{10,515})^2}{(.08)^2} = 330$$

$$n_2 = \frac{2^2 (\frac{7,218.83}{10,185})^2}{(.08)^2} = 314$$

$$n_3 = \frac{2^2 (\frac{7,791.24}{11,514})^2}{(.08)^2} = 286$$

Table 29. Calculation of Standard Deviations for Urban and Rural Areas in Lane County

Family income class	Number of families			Class Mark (X)	d (X-A)
	Lane, f_1	Rural, f_2	Urban, f_3		
Less than $1,000	1,031	461	570	500	-8,000
$1,000 to $1,999	1,477	583	894	1,500	-7,000
$2,000 to $2,999	2,288	896	1,392	2,500	-6,000
$3,000 to $3,999	2,586	797	1,789	3,500	-5,000
$4,000 to $4,999	2,564	938	1,626	4,500	-4,000
$5,000 to $5,999	3,166	1,222	1,944	5,500	-3,000
$6,000 to $6,999	3,814	1,494	2,320	6,500	-2,000
$7,000 to $7,999	4,468	1,629	2,839	7,500	-1,000
$8,000 to $8,999	4,518	1,633	2,885	8,500 (A)	0
$9,000 to $9,999	4,393	1,548	2,845	9,500	1,000
$10,000 to $11,999	8,024	2,669	5,355	11,000	2,500
$12,000 to $14,999	7,264	1,993	5,271	13,500	5,000
$15,000 to $24,999	7,311	1,664	5,647	20,000	11,500
$25,000 to $49,999	1,426	318	1,108	37,500	29,000
$50,000 and more	411	157	254	50,000	41,500
TOTAL (N_i)	54,741	18,002	36,739	--	
MEAN	10,515	10,185	11,514		

$\Sigma f_1 d = 126,165,000$ $\quad \Sigma f_1 d^2 = 3,484,750,500,000$

$\Sigma f_2 d = 23,894,000$ $\quad \Sigma f_2 d^2 = 969,812,500,000$

$\Sigma f_3 d = 102,271,000$ $\quad \Sigma f_3 d^2 = 2,514,938,000,000$

$$s_i = \sqrt{\frac{\Sigma f_i d^2}{N_i} - \left(\frac{\Sigma f_i d}{N_i}\right)^2} = \text{standard deviation}$$

$s_1 = 7,638.44$ (total) $\quad i = 1$, total

$s_2 = 7,218.83$ (rural) $\quad i = 2$, rural

$s_3 = 7,791.24$ (urban) $\quad i = 3$, urban

The greatest sample size, 330, was taken as appropriate for this study. Allowing for an 80 percent response rate, the number contacted should be approximately 410. While not eliminating non-response bias, this procedure provides an adequate sample size by anticipating some non-response. This sample was allocated to the urban and rural strata by the following formula (21, p. 209)

$$n_j = (\text{total sample size}) \left(\frac{N_j \, s_i}{\Sigma N_j \, s_i}\right)$$

n_j = sample size for urban or rural
N_j = population of urban and rural
s_i = standard deviation for urban or rural

Rural:

$$n_r = (410)\frac{(18{,}002)(7{,}218.83)}{(18{,}002)(7{,}218.83) + (36{,}739)(7{,}791.24)} = 128$$

Urban:

$$n_u = 410 - n_r = 282$$

Sampling Procedure

Census tracts were stratified into 17 rural and 37 urban; urban being those tracts within Eugene-Springfield and vicinity boundaries as designated in a 1970 Census of Population and Housing Map (54). The remainder were rural (Table 29).

Five urban tracts were eliminated from the list. Those tracts were eliminated because of their proximity to the University of Oregon campus where large numbers of college students reside. Where living groups of students were encountered, they were not considered valid sample units because students are not usually active full-time work force participants. Both rural and urban tracts were stratified into equal groupings of tracts on the basis of median income. The number of tracts among groups was kept approximately equal.

Using a table of random numbers, two tracts were selected from each strata. Assigning consecutive numbers to tracts within each group, beginning with one in each group, the procedure used is as explained in Steel and Torrie (43, p. 10). It was pre-determined to open a book (Steel and Torrie) to the table of random numbers, drop a finger on the page, and use the four numbers to the right of the finger to designate the row and column for the assigned number of the tract to be selected. If the number so designated was greater than numbers assigned (or zero), numbers to the right of the selected number were used until an appropriate number was found. The next number to the right of this number was used to select the second tract in the income strata.

For the first rural strata, the four numbers were 3531. In row 35, column number 31, the number is 5. Thus the

fifth tract in group 1 is selected. The next number is 7, so it is disregarded. The number following is 3, so the third tract in group 1 is selected. Following this procedure tracts 8, 4, 12, 11, 1, and 17, were selected for rural areas; and 42, 36, 32, 33, 41, 27, 47, 22, 24, 51, 31, and 30 were selected for urban areas. Thus a total of 18 Census tracts were selected in which to sample.

Each of the six sample rural tracts was allocated one-sixth, or 21, of the rural sample size as earlier calculated. This procedure yielded 126 as a sample size, two less than the calculated 128. The remaining were randomly assigned to two of the tracts.

In these rural areas interviewers were given a random starting place and instructed to proceed a pre-determined number of dwelling units, then commence interviewing. Thereafter, interviewers were to select every "nth" dwelling unit and take an interview. The "nth" rate was dependent on the total number of dwelling units in the tract in question and selected to obtain the required interviews and complete coverage of the tract.

Each of the 12 urban tracts was allocated one-twelfth of the urban sample, or 23. This procedure yielded 276, six short of the required 282. These six were randomly allocated to six tracts.

In urban areas it was desirable to randomly select blocks in selected tracts in which to interview, because of

Table 30. Census Tracts in Lane County, Stratified by Urban and Rural and by Median Family Income

Tract number		Median family income	All occupied housing units
Rural (1-17)			
Group 1:	5*	$ 6,519	209
	14	7,479	542
	8*	7,484	319
	9	8,061	2,076
	4*	8,188	2,502
	16	8,277	1,030
Group 2:	7	8,384	2,020
	12*	8,416	1,827
	15	8,478	1,550
	11*	8,667	1,248
	13	8,764	1,662
	3	9,009	519
Group 3:	1*	9,198	1,312
	6	9,205	674
	17*	9,442	1,330
	2	9,620	864
	10	9,687	1,115
Urban (18-54)			
Group 1:	40	5,926	1,060
	42*	7,193	1,297
	36*	7,220	887
	45	7,843	2,363
	19	7,946	1,840
Group 2:	34	8,356	1,711
	32*	8,371	1,668
Urban cont.			
	33*	$ 8,623	2,575
	43	9,219	1,663
	25	9,227	636
Group 3:	18	9,426	810
	26	9,500	643
	35	9,632	606
	41*	9,747	1,413
	27*	9,845	915
Group 4:	44	9,887	1,666
	46	9,954	1,130
	23	10,182	1,464
	47*	10,320	1,419
	22*	10,337	779
Group 5:	28	10,464	1,429
	24*	10,587	1,968
	20	10,662	1,153
	51*	10,700	1,238
	21	10,757	1,277
	50	10,903	1,101
Group 6:	53	11,705	612
	31*	11,735	1,411
	29	12,286	1,185
	52	13,353	574
	30*	13,867	856
	54	14,003	923
Lane County		9,332	68,257

* sample tracts, randomly selected

SOURCE: (54, p. 24-28)

the heavy population density in these areas. Where occupied housing units in a block were less than the sample size, the block was eliminated. Blocks in each of the twelve urban tracts were listed and randomly selected via the random numbers table, using the procedure described above for selecting tracts. The 1970 Census of Housing provided a list of blocks with detailed maps (52). Ten blocks in each urban tract were selected, for a total of 120 blocks as shown in Table 30. A random starting place was selected in each tract, and interviewers were instructed to count a designated number of dwelling units from this point, then take the first interview at that dwelling unit. Thereafter every "nth" dwelling unit was selected, "n" being dependent upon required sample size and occupied housing units in each tract. This approach ensured even coverage of selected tracts.

Interviewers proceeded through each tract by moving along the side of the street (road) of the random starting point and moving clockwise around the block (or along a rural road). When a block (or rural road) was covered, interviewers began at the closest point of the closest assigned un-completed block (rural road) until finished with the tract. Counting was carried into this next block (rural road) from the previous one.

The original call and one call-back at a different time of day was required before a substitute was allowed.

Table 31. Selected Urban Blocks for Sample

Tract number	Block Number									
42	409	301	411	510	418	114	104	503	415	419
36	105	101	103	307	301	204	505	312	205	112
32	406	505	105	202	118	206	431	113	115	503
33	901	208	105	520	102	129	503	127	306	606
41	307	104	401	303	407	308	402	405	103	406
27	114	115	105	206	211	116	112	110	104	210
47	215	312	321	401	218	220	318	301	104	414
22	304	108	201	306	102	106	303	101	104	207
24	522	301	509	609	202	407	409	503	408	103
51	122	109	107	106	121	214	211	203	103	102
31	205	202	605	105	103	602	102	505	606	306
30	107	204	414	408	110	102	203	303	207	405

REFERENCE: 1970 Census of Population, Block Statistics, Eugene, Oregon, Urbanized Area; and Census Tracts, Eugene, Oregon, Standard Metropolitan Statistical Area.

The first substitute was the dwelling unit before the assigned one; the second substitute was the dwelling unit after the assigned one.

Instructions to the interviewers were to interview any principal income earner who was normally employed full-time. This included unemployed (but in the labor force) or retired individuals.

The Questionnaire

The questionnaire was developed with the technical assistance of a Portland, Oregon, marketing research firm; Bardsley and Haslacher, Inc. This firm also conducted interviews using the data gathering procedures discussed above.

Extensive data were gathered with the questionnaire including, of course, information necessary to construct variables to be used in the economic model.

In addition, other questions were asked for a number of reasons; putting the respondent at ease, jogging his memory, and obtaining descriptive material. In narrowing the scope of the project to a manageable size, numerous interesting and useful hypotheses were not tested, but in some cases the necessary data were obtained. The reader is encouraged to consult the section on further research needed in the last chapter, and the questionnaire facsimile.